1990

1990-1992 Catalog

University of Alabama in Huntsville

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1990-1992
Catalog
The University of Alabama in Huntsville is committed to equal opportunity in employment and education. The University does not discriminate in any program or activity on the basis of race, color, religion, sex, age, or national origin, or against qualified handicapped persons, and it maintains an affirmative action program for protected minorities and women.

Although this catalog intends to reflect currently any policies or rules of The Board of Trustees of The University of Alabama referred to or incorporated herein, users are cautioned that changes or additions to such policies, rules, tuition and fees have become effective since the publication of this material. In the event of such a conflict the current statements of Board policy contained in the official minutes and manual of rules, by-laws, and guidelines shall prevail.

The University of Alabama in Huntsville also reserves the right to modify its institutional policies from time to time. Students enrolling in the University are subject to current policies and rules as contained herein and as subsequently stated or modified by official institutional action.
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ACADEMIC CALENDAR 1990-91

Fall Term 1990-91

Labor Day Holiday ......................................................... September 3, 4, 1990
Registration ...................................................................... September 14
First Saturday Class ..................................................... September 15
Classes Start .................................................................... September 17
Thanksgiving Holidays .................................................. November 22, 23
Last Class ......................................................................... November 27
Study Day ......................................................................... November 28
Exams ............................................................................. November 29, 30
Exams .............................................................................. December 3, 4
Commencement, Sunday ............................................... December 9
Christmas Holidays ...................................................... December 24, 25, 26
Christmas Holiday continued ......................................... December 27, 28, 31

Winter Term 1990-91

New Year's Day Holiday ................................................ January 1, 1991
Registration ...................................................................... January 3
Classes Start ..................................................................... January 4
Last Class ......................................................................... March 14
Exams ............................................................................. March 15, 16, 17, 18, 19

Spring Term 1990-91

Registration ...................................................................... March 22, 1991
First Saturday Class ..................................................... March 23
Classes Start ..................................................................... March 25
Memorial Day Holiday .................................................. May 27
Last Class Day ................................................................. June 3
Exams ............................................................................. June 5, 6, 7, 10
Commencement, Sunday ............................................... June 15

Summer Term 1990-91

8 Week Term

Registration ...................................................................... June 14, 1991
Classes Start ..................................................................... June 17
Independence Day ........................................................ July 4, 5
Last Class Day .................................................................. August 13
Study Day ......................................................................... August 14
Exams ............................................................................. August 15, 16, 19

10 week Term

Registration ...................................................................... June 14, 1991
Classes Start ..................................................................... June 17
Independence Day Holiday ............................................ July 4, 5
Last Class Day .................................................................. August 27
Exams ............................................................................. August 28, 29, 30
# ACADEMIC CALENDAR 1991-1992

## Fall Term 1991

<table>
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<tr>
<th>Date Range</th>
<th>Event</th>
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<tbody>
<tr>
<td>September 2, 1991</td>
<td>Labor Day Holiday</td>
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<tr>
<td>September 19,</td>
<td>Classes Begin</td>
</tr>
<tr>
<td>November 27,</td>
<td>Last Class Day</td>
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<tr>
<td>November 28, 29</td>
<td>Thanksgiving Holiday</td>
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<tr>
<td>December 2, 3, 4, 5</td>
<td>Exams</td>
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<tr>
<td>December 15,</td>
<td>Commencement</td>
</tr>
<tr>
<td>December 20, 23-27, 30-31</td>
<td>Christmas</td>
</tr>
<tr>
<td>January 1, 1992</td>
<td>New Year's Day</td>
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## Winter Term 1992

<table>
<thead>
<tr>
<th>Date Range</th>
<th>Event</th>
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<tbody>
<tr>
<td>January 6, 1992</td>
<td>Classes Begin</td>
</tr>
<tr>
<td>January 13,</td>
<td>Martin Luther King Observance</td>
</tr>
<tr>
<td></td>
<td>(No classes 2:30 - 3:45)</td>
</tr>
<tr>
<td>March 14,</td>
<td>Last Class Day</td>
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<tr>
<td>March 16, 17, 18, 19</td>
<td>Exams</td>
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</tbody>
</table>

## Spring Term 1992

<table>
<thead>
<tr>
<th>Date Range</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
<td>March 27,</td>
<td>Registration</td>
</tr>
<tr>
<td>March 30,</td>
<td>Classes Begin</td>
</tr>
<tr>
<td>May 25,</td>
<td>Memorial Day Holiday</td>
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<td>June 9,</td>
<td>Study Day</td>
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<tr>
<td>June 10, 11, 12, 15</td>
<td>Exams</td>
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<tr>
<td>June 21,</td>
<td>Commencement</td>
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## Summer Term 1992

<table>
<thead>
<tr>
<th>Date Range</th>
<th>Event</th>
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<tbody>
<tr>
<td>June 19,</td>
<td>Registration</td>
</tr>
<tr>
<td>June 22,</td>
<td>Classes Begin</td>
</tr>
<tr>
<td>July 3,</td>
<td>Independence Day Holiday</td>
</tr>
<tr>
<td>August 18,</td>
<td>Study Day</td>
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<tr>
<td>August 19, 20, 21</td>
<td>Exams</td>
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General Information

The University of Alabama in Huntsville is a campus of The University of Alabama System. It is a teaching and research institution dedicated to excellence in the promotion of the intellectual, technological, and economic enhancement of the state, region, and nation. The University offers a wide range of academic and professional majors at the bachelor’s and master’s levels and a specialized selection of doctoral level programs.

The University is committed to developing a faculty of the highest quality, and to providing an environment which facilitates its continued intellectual and professional growth. The University Faculty is, in turn, committed to stimulating the intellectual development of its students.

The institution recognizes its responsibility to prepare its students to take leadership roles, think creatively and critically, and communicate clearly; to respect knowledge and the pursuit of truth; and to engage in the challenge and pleasure of a lifetime of learning. Because of its location in a technologically oriented major population center, UAH offers educational opportunities for traditional students and those individuals who are beyond the traditional college age.

UAH recognizes its responsibilities to the Huntsville community and the surrounding region, one of the nation’s key centers for governmental and industrial advanced technological research. In meeting those responsibilities the institution provides unusual opportunities for new and creative programs, especially in science, engineering, primary care medicine, and related areas. One of the distinguishing characteristics of UAH is its sustained core of basic and interdisciplinary research, augmented by its research centers which focus on areas of national high priority. Both the research activities and classroom experiences at UAH are supported by contemporary computer technology.

Through the excellence of its academic programs, faculty research and student support activities, UAH provides unique opportunities for the personal and professional development of each student. UAH, through its graduates and its programs, aspires to contribute to the economic advancement, cultural enrichment, and quality of life.

History

The University of Alabama in Huntsville (UAH) is a part of the University of Alabama System. In June 1969, the University of Alabama Board of Trustees established the University of Alabama System with three independent, autonomous campuses at Huntsville, Birmingham, and Tuscaloosa. Each campus has a separate president who reports to the Board of Trustees through the chancellor of the system. Academic programs were initiated in Huntsville in 1950; in 1963 degree opportunities at the master’s level were provided and in 1964, at the baccalaureate level. The first master’s degree based on work begun and completed in Huntsville was awarded in 1964 and the first undergraduate degrees in 1968. Doctoral programs in physics and engineering were initiated in 1971. In 1973 UAH received its first residents in family practice and its first medical students taking electives toward their M.D. degree from the University of Alabama School of Medicine. UAH’s first full-time medical students began their core clinical experience at the Huntsville component of the University of Alabama School of Medicine in the fall of 1974.

This brief chronology indicates that the programs at UAH are still in the developing stages, a characteristic of viable programs in any university. UAH was brought into being to meet the specific needs of a scientific and technological enterprises and the cultural and intellectual needs of a rapidly expanding region. Since UAH is new, it is relatively unfettered by tradition and patterns of established practice. It is our intention to be innovative, even experimental, to ex-
explore what is new, to evaluate existing programs continually, to develop and establish curricula and pedagogical techniques calculated to help students live and perform well in a complicated environment.

Accreditation

UAH is accredited by the Southern Association of Colleges and Schools. Academic programs in chemistry, computer science, engineering, nursing, and emergency medical technology are accredited by their respective accrediting associations. See program sections of the catalog.

Facilities

The 337-acre UAH campus is in northwest Huntsville adjacent to Cummings Research Park. The 20 university buildings, all of which have been constructed since 1960, contain modern equipment and exemplify modern functional design. The 10-acre medical campus is in the downtown medical district and provides two modern buildings for medical education and patient health care.

Morton Hall, which is the oldest building on campus, houses classrooms, computer laboratories, and offices for the Dean and several of the departments in the College of Liberal Arts.

The Science Building contains classrooms, computer laboratories and instructional and research laboratories for programs in biological, environmental, and physical sciences as well as offices for the Dean and several of the departments in the College of Science. The laboratories are furnished with modern laboratory equipment and the building penthouse contains a live animal room and a greenhouse.

The Kenneth E. Johnson Research Center contains research laboratories and offices for that Center, the Alabama Solar Energy Center, and the Center for Robotics.

Madison Hall contains executive administrative offices, classrooms, and the Department of Mathematical Sciences.

The Research Institute contains offices for Research Administration, and offices and research laboratories for the Center for Microgravity & Materials Research and the Center for Applied Optics. Additionally, it houses the University's mainframe computer facility and the Office of the State Climatologist.

The Engineering Building contains classrooms, computer laboratories, and instructional and research laboratories as well as offices for the Dean and the various engineering departments that comprise the College of Engineering.

The contemporary University Center houses the Division of Student Affairs, the Office of Admissions and Records, the Academic Advisement and Information Center, Career Planning and Placement Office, Cooperative Education Office, University Bursar's Office, Student Government Association, the Office of Testing Services, and *Exponent*. It has facilities for dining, assemblies, meetings, dramatic presentations and recreational activities as well as housing the University Bookstore.

The Frances C. Roberts Hall, a two-unit complex, contains classrooms, laboratories, and offices for the art, history, and music departments in the College of Liberal Arts. It also contains a large auditorium/lecture room for varied university programs.

The College of Nursing Building is a contemporary triangular structure that houses the College of Nursing. Its four levels contain administration and faculty offices, classrooms, an auditorium, laboratories and service areas, and a large and well equipped Learning Resources Center. The newly established Wellness Center is also housed in the building.

The modern Administrative Science Building contains classrooms, computer laboratories, and offices for the Dean and the departments of the College of Administrative Science. This
state of the art teaching facility also has a large auditorium/lecture hall and several student lounge areas.

The Computer Science Building is located across Sparkman Drive from the other campus facilities and contains offices and computer classrooms and laboratories for the Computer Science Department as well as computer classrooms for the Division of Continuing Education.

The Alumni House houses the offices of alumni affairs, development, and governmental relations of the Office of University Advancement.

The Marion Beirne Spragins Hall has classrooms and offices for Health and Physical Education and Athletic Department faculty and staff, a gymnasium with a seating capacity of 2800, a swimming pool, handball courts, and other physical education and recreational facilities.

The Central Receiving and Shipping Building houses the shipping and receiving office and storage facility, the Central Mail Room, and Telephone Services.

The Physical Plant Building contains offices, shops, and storage areas for the Physical Plant Department, which include administrative offices, custodial services, campus police, campus safety, maintenance, grounds services, stockroom and the University motor vehicle pool.

The Tom Bevill Center has 100 hotel rooms, a restaurant, offices for the U.S. Army Corps of Engineers Training Division and the University's Division of Continuing Education, meeting rooms, and computer labs. It also has sophisticated audio-visual systems, computer networking, links to Huntsville's new super computer and easy access to other facilities on campus and in the nearby Cummings Research Park.

The WLRH Radio Station facility is located on the south end of the University campus and houses public radio station WLRH-FM. The University leases the facility to the Alabama Educational Television Commission but has no involvement in the operation of the radio station.

The Printing Services Building houses the printing services department and provides offices, darkrooms, print shop, and other special facilities to meet the University's printing needs.

The Clinical Science Center in the downtown medical district contains the School of Primary Medical Care administrative offices and academic support services, including the Health Sciences Library and the Office of Audio-visual and Production Services. The building is the headquarters for the school's medical student, continuing medical education, and emergency medical technician-paramedic training programs. It contains classrooms, faculty offices, and research laboratories, and an auditorium.

Adjacent to the Clinical Science Center is the UAH Medical Clinics building, which houses patient care services in family practice (the UAH Family Practice Center), internal medicine, obstetrics and gynecology, pediatrics, and psychiatry, as well as patient education services, clinical-support services, faculty offices, and the administration of the UAH-Huntsville Hospital Family Practice Residency Program. The Veterans Administration also has offices and patient care facilities in the building to provide health care services for the veterans of the north Alabama area.

Library

The Library supports the academic and research programs of the University. It has a collection of 346,138 volumes along with collections of U.S. Government Documents, sound recordings, materials in microform and microfiche, and manuscript collections designed to support the efforts of students and faculty. In addition, the library currently receives almost 3,250 periodicals. For students in the social sciences and humanities, microfiche collections such as the Evans Imprint series and the Library of American Civilization and slide collections on Afro-American art are of particular value. For students in the sciences, work at UAH is supported by the Redstone Scientific Information Center which is located five miles from campus. This li-
Library was developed to support the wide-ranging research interests of NASA and the United States Army Missile Command, and its collections of 300,000 volumes and 3,300 journal subscriptions along with more than 1.8 million research reports make it one of the finest scientific libraries in the southeast. It is available without charge to faculty members and graduate students of the University. Reciprocal borrowing agreements are also in force with Alabama A&M University and the University of North Alabama to allow UAH students free access to those libraries.

The library is also a member of several consortia that are designed to bring research materials not otherwise available to campus. Its membership in OCLC, the Network of Alabama Academic Libraries, and Alabama Library Exchange all are designed to facilitate rapid Interlibrary Loan Service to students without charge.

Library services, including study rooms, orientations for classes, and online bibliographic database searching, are designed to assist in the research effort. The library catalog is available online from any terminal attached to the University computer or through dial access.

A library handbook detailing individual services of the library is available without charge at the library's reference desk.

The University Noojin House

Built in 1950 as the private residence of F. Kenneth Noojin, the house became available to the community through acquisition by the University of Alabama Huntsville Foundation, which in turn gave the facility to the University. The house is available for receptions, conferences, luncheons, parties, and workshops. The faculty, staff, students and community are encouraged to utilize the gracious facility.
Student Information

Student Affairs

The Division of Student Affairs provides services to individual students which facilitate the student's attainment of academic, cultural, social and personal goals. It also coordinates and supports group activities and campus events that enhance the quality of student life at the University. The Division of Student Affairs also supports Student Government Association activities and programs, as well as interprets and administers the Student Judicial Code, which protects student rights and assists students in their awareness of student responsibilities. These student needs and interests are served by the university center, housing, athletics, club sports, student life, auxiliary services, career planning and placement, intramurals, student development programs and leadership training.

Tutoring Services

Tutoring services are available through the Student Development Programs Office, the Veterans Educational Assistance Program, and UAH satellite unit of the North Alabama Educational Opportunity Center (NAEOC). All students at UAH are eligible for the no-fee assessed tutoring through the Student Development Services Office and NAEOC. Students desiring to tutor or be tutored may make application with the EOC counselor-coordinator at the EOC Office, Room 118, University Center, or telephone 895-6290, or Student Development Programs Office, Room 113, University Center, or telephone 895-6203.

Counseling Services

Personal counseling is available to all UAH students through the Student Development Services Office. In keeping with accepted professional practice, all counseling is confidential. No information is released to University officials, faculty members, parents or outside agencies without the explicit authorization of the students, except when prohibited by law. Students may be referred by faculty or staff members or they may contact the Student Development Services office directly, 895-6203.

Services for Students with Disabilities

The Student Development Services Office provides a full-time counselor for students with disabilities.

The services offered to disabled students include: Priority registration during advance registration periods, classroom accommodations, assistance locating note-takers and readers, ordering textbooks on tape, counseling, a quarterly student newsletter, student support group, auxiliary equipment, assistance during orientation, liaison to UAH faculty, free tutors for most subjects, liaison to Admissions, Housing and Financial Aid Offices, UAH accessibility guide and maps, resource library of disability information and liaison to community resources.

In addition, we provide educational “Awareness” programs for students, faculty and staff as well as providing inservice faculty training on accommodating students with disabilities.

Before enrolling, we encourage you to visit our office so we can assist you with any needs you may have. Appointments may be made in person in the SDS office, Room 113, University Center, M-F or calling 895-6203.
Medical Services

UAH students who need a family physician may become patients of the UAH Family Practice Center by going to the UAH Medical Clinics in the Huntsville Medical District to complete the intake forms. All UAH students registering as patients are required to have valid UAH identification cards.

UAH Medical Clinics office hours are 8 a.m. to 5 p.m. Monday through Friday. Appointments may be made by calling 536-5511.

All patient care services provided by UAH School of Primary Medical Care are on a fee-for-service basis.

UAH Wellness Center

UAH students with minor illnesses and injuries may be seen at the Wellness Center located in room 104 of the Nursing building. Walk-ins and appointments are welcomed.

The basic charge is covered in the student health fee; however, laboratory costs will be billed to the student at a modest charge. The Wellness Center is open Monday through Friday 8:15 a.m. to 5:00 p.m. Extended hours of operation will be announced each term in “The Exponent”. The phone number is 895-6775.

Career Planning and Placement

The Career Planning and Placement Office provides developmental and educative services which assist students in identifying their individual capabilities, interests, skills, and acquired knowledge, and to relate these characteristics to meaningful vocational options. This office communicates career, occupational, and employment information to the University as a whole, and interprets options available to students within graduate school, business, government, education, and non-profit organizations. The culmination of these activities is placement counseling and referral to employers or graduate schools.

The Career Planning and Placement Office offers the following services to UAH students actively pursuing a degree and UAH graduates: part-time employment referral within the community of Huntsville and surrounding areas for currently enrolled students; full-time placement referral and on-campus interviews for graduating seniors, students currently enrolled in a graduate degree program, and graduates; career planning assistance with professional staff; workshops to develop skills in resume writing, interviewing, and job search planning; use of the SIGI PLUS computer-assisted guidance system to assess interests, abilities, and values and relate these characteristics to 426 occupations; access to a computerized guidance information system with occupational and college information through Montgomery; a Career Resource Center of occupational information, company literature, salary information, and graduate school information; lists of job openings throughout the United States; a Job Fair each Fall and Spring; and, Career Information Days for various Schools at UAH.

A credential file which includes 10 resumes, an authorization form, and a candidate registration form is established for each senior, graduate student (currently enrolled in a degree program), or UAH graduate who registers with this office. Each registered person receives a monthly newsletter, Career Directions, which provides current employment trends, job hunting hints, and the monthly on-campus recruitment schedule.

Students may register for any of the services at the Career Planning and Placement Office, 212 University Center. Appointments may be made with Placement staff members by calling 895-6612 between 8:15 a.m. and 5:00 p.m., Monday through Friday.
University Housing

The University of Alabama in Huntsville offers a variety of housing facilities to meet the needs of its diverse student population. Southeast Campus Housing, a cluster of nine three story residences located on South Loop Road near Madison Hall and most engineering and sciences classrooms, offers suites and apartments. In this area you may choose to live in a single (private) or double (shared) room in a three-bedroom suite. Each three-bedroom suite has a living room, full kitchen with refrigerator, range, oven, and sink, dining area, and double bathroom with an adjoining vanity area. Suites are airconditioned and carpeted and are furnished with a loveseat, lounge chairs, end tables, and a dining table and chairs. Bedrooms have extra-long twin beds, study desks and chairs, nightstands, and a built-in closet. In the Southeast Campus area, you may also request a furnished or an unfurnished one bedroom apartment, and a number of one-bedroom apartments accessible to disabled students are also available. All Southeast Campus Housing residents have the use of a laundry room with coin operated washers and dryers and pay telephones, a mailroom, and a study lounge. Ample parking is available adjacent to the residences, and there is a sandpit volleyball court in the center of the Southeast complex.

Central Campus Housing, scheduled to open for the fall semester, 1991, is a seven-story, somewhat traditional residence hall located directly adjacent to the University Center and in close proximity to the library, Spragins Hall, Roberts Hall, the Science Building, the Nursing Building, and the Administrative Science Building. In this residence, each student will live in an air-conditioned, carpeted private room in a four-person suite and will share a bath with one other suitemate. Suites, accessible from the ground-floor building entrances by an elevator or by stairs, will be furnished with a mini-kitchen (small refrigerator, microwave oven, and sink), dining/study table and chairs, sofa, and easy chairs. Each bedroom will have a regular-length twin bed, a wardrobe, a desk with bookshelf and light, and a study chair. Laundry facilities, a recreation room, a study room, and mail service will be available in the Central Campus residence. The residence will be connected by a covered walkway to the University Center, where you will find the cafeteria, game room, bookstore, and various student activities offices and meeting rooms.

Accommodations for student families is provided in University Circle Housing, a cluster of 88 two- and three-bedroom apartments located across University Drive from the central UAH campus. Apartments, which are centrally heated and airconditioned, may be rented supplied with basic living, dining, and bedroom furnishings, or unfurnished for families with their own belongings. A laundry room, with coin-operated washers and dryers, and a group study room are located within the apartment complex, which is close to University Place Elementary School and to numerous shopping facilities.

Within each residence area is a staff of student Resident Assistants. The RAs develop activities and programs, provide assistance to student residents, and help create a residential community which contributes to effective student learning, personal and social growth, and responsibility.

Anyone who has been admitted as a student to UAH is eligible for University Housing. You may apply for housing before you have been admitted, although final housing assignments are contingent upon confirmation of admission. Assignment priority is based upon the date of receipt of your application and housing deposit. The University Housing Lease is for a nine-month academic year period (September - June) with a separate summer lease available for certain facilities. Housing charges are due when tuition is due each academic term. Applications, current rates, and additional information are all available from the Housing Office at 606-A South Loop Road (205/895-6108). Individual and group tours of UAH Housing may be arranged by appointment through the Housing Office.
Preschool Learning Center

There is an on-campus preschool provided by the University Preschool Parents Association to accommodate the students, faculty, and staff, as well as the public. A stimulating environment is provided daily at the center, according to a fundamental philosophy that learning should be fun. In addition to cognitive development, the center focuses attention on the social, physical, and emotional development of the children enrolled. The center is staffed by professional teachers and well-qualified teacher aides, each of whom is attentive to the needs of individual students. The center has several attendance plans to accommodate the various schedules of student parents. Call 837-9553 for information.

The University Center

The University Center is a part of the co-curricular educational program of the University and is a focal point of the campus. Designed for the entire campus community, it offers facilities and programs to meet the intellectual, social, recreational, and cultural needs of students, faculty, staff, alumni, and the entire Huntsville community.

The facility offers meeting rooms, a dining room, a cafeteria, lounges, a game room, TV viewing rooms, an information desk, a computer terminal room, an art gallery, and the University Bookstore.

The offices of the Vice-President for Student Affairs, the Student Government Association, Association for Campus Entertainment, the Exponent, Admissions and Records, Financial Aid, Academic Advisement, Co-op, Career Planning and Placement, Testing Services, Student Activities, Student Development Services and the Bursar are also located in the University Center.

Information Desk

In addition to having general campus information, the information desk sells a variety of items. The university community may pick-up or purchase tickets for campus events, get assistance in scheduling events in the Center, or receive directions to campus or community points. Typing elements are available to those with a current student I.D. Academic, admissions, and financial aid information is available from the information desk in the student services corridor of the building.

Lounges

Two well lit, spacious lounges, designed as a place to relax and meet friends, are equipped with comfortable furniture.

Game Room

Located in the lower level of the Center, the game room has pool tables and ping pong tables as well as a wide variety of pinball machines and video games. A large number of board games are also available. Three TV lounges, with cable TV, are located in the game room.

Meeting Rooms

The Center has 10 meeting rooms designed with multipurpose functions. The rooms can accommodate meetings of from 10 to 500 people. The Center has a large number of tables, chairs, portable stage and audio-visual equipment and can assist in designing set-up to make any conference or meeting a success.

University Bookstore

Located on the lower level in the University Center, the UAH Bookstore is a full-service
college bookstore operating for the needs and convenience of the UAH Community. The University Bookstore provides the Campus’ required and supplemental textbooks, a large selection of technical and reference books and various study aids including Cliff’s notes and Schaum’s outline series. The bookstore also buys back used texts from students during the store hours year round. In addition to these services, the bookstore will special order any book in print.

In the University Bookstore, students can find UAH Campus sportswear, UAH insignia gifts, cards, imprinted notebooks, a wide variety of school supplies, calculators, and a choice of Artcarved or Josten’s class rings.

University Food Service
A completely modern and spacious serving and dining area greet customers to the University Cafeteria. A complete line of short order items, ice cream shop, deli, and hot food are available to patrons. A more formal dining area, located behind the cafeteria, is available for luncheon buffets and catered dinners in the evenings. The Food Service will cater to all areas of the Center as well as other parts of the campus. Additionally, several types of meal plans are available for purchase by students, faculty and staff.

Activities
The Student Activities office offers a wide variety of activities in which students may become involved. The advisor to the sororities and fraternities and the Association for Campus Entertainment is located in this office. The Student Activities office organizes a variety of activities for students and their families such as the weekly Children’s Hour, Family Night Out and College Bowl Program. The Student Activities office also maintains a complete listing of clubs and organizations.

Student Government Association
The Student Government Association promotes the welfare of students in all areas of University life. Its primary purpose is to help improve the educational environment. This includes promoting academic innovation and working closely with faculty and administration toward making desirable changes in institutional policies.

The SGA is responsible for developing and sponsoring programs which will enrich the student’s cultural, intellectual, and social life. Each student enrolled in UAH is automatically a member of the SGA. An executive branch, a fifteen member legislature, and a five member arbitration board are responsible for carrying out the official business of the organization.

The association sponsors over sixty clubs and organizations across campus in addition to providing many student services such as health insurance, special rates for community cultural events, and a student directory.

Association for Campus Entertainment
The Association for Campus Entertainment (ACE) presents student activity programs for UAH through its seven activity boards. The purpose of ACE is to provide entertainment, as well as to enhance a student’s cultural, intellectual and social life.

ACE also provides the students with a telephone information service known as “The Source”, which can be reached at 895-6666.

The activity boards contained in ACE are as follows:

Cabaret
The ACE Cabaret Series presents various types of live performers to UAH, from comedians to magicians. Past entertainers have included Eddy Strange, Wayne Cotter, and Emo Phillips, and future shows promise to be as exciting as ever.

Cabaret also operates “Mom’s” – UAH’s only nightclub. Each Thursday night, Mom’s pro-
vides live entertainment and free refreshments for a dollar. This coffeehouse is conveniently located in the University Center. Bring your friends to hear nationally known comedians and musicians, or participate in “Mom’s” amateur contest! It’s the hottest place on campus!

Performing Arts
University Playhouse is among the many fine theatre companies in Huntsville. Its reputation is known throughout the Southeast. Productions have included “The Rainmaker”, “Extremities”, and “Murder in the Magnolias”, among others. University Playhouse presents a wide range of successful plays, from musicals to comedies to dramas. In addition to fine plays, ACE presents drama workshops and renowned performing arts groups for the University community.

Film and Video
The Film Series consistently provides a wide variety of quality films which appeal to the broad spectrum of UAH students. Film genres include classical, horror, comedy, adventure, and drama. In addition to weekly screenings of several types of films, festivals featuring specific performers or directors are shown each term. Special features to watch for include midnight movies, free food nights, the “Rocky Horror Picture Show”, outdoor films, and “dive-in” movies. The intent behind the series is to entertain as well as provide students with a wide cultural background in films and to give students an opportunity to investigate the social and economic importance of film as an art form.

Lectures and Symposium
The ACE Lecture Series serves as an extension of the classroom and helps bring together the academic and social environments within the University, presenting speakers on the serious issues of today. We also bring stars and speakers from popular television shows and motion pictures. Past guests have included Adrian Cronauer, George Takei and James Doohan from “Star Trek”, Spanky McFarland, Phyllis Schlafley, and Sarah Weddington.

Special Events
Special Events committee is responsible for planning annual events such as Homecoming, Octoberfest, and Springfest, which is the culmination of a year’s worth of activities. Springfest is mandatory for students seeking fun! All activities are planned around a central theme; there will be food, fun, music, fun, games, fun, carnival-type booths, fun and more fun!

Publicity and Promotions
The Publicity and Promotions Directors cooperate to inform potential audiences of all programs that the other ACE Activity Boards are bringing to campus. Radio, television, and printed materials are all utilized in the effort to publicize ACE programs.

Student Organizations
Accounting Club
The purpose of the Accounting Club is to promote interest in the accounting profession and provide students an opportunity to become better acquainted with each other, the accounting faculty, and accounting practitioners. Activities include meetings which feature guest speakers, facility tours, and social activities. Membership is open to all students in accounting and related disciplines.

Amateur Radio Association
The design of the Amateur Radio Association is for licensed amateurs and would be amateurs. The organization does have facilities for amateur frequencies (DX). This group does participate in the local repeaters which includes pocket radio.
American Institute of Aeronautics and Astronautics

The American Institute of Aeronautics and Astronautics (AIAA) holds meetings and participates in projects to supplement academic studies. Our programs include lectures by leaders in the aerospace industry, field trips to industry, and Regional Student Conferences where original technical papers by undergraduate and graduate student members are presented. If you are at least a part-time student with an interest in space related topics, you should join our U.A.H. student chapter of the AIAA. For more information about membership contact Joe Carden at 852-5867 or leave messages.

American Institute of Chemical Engineers (AIChE)

The objective of AIChE is to contribute to the development of chemical engineering at UAH through activities involving the faculty and student members while promoting the professional development of its members by programs relating the student organization to local, regional and national AIChE activities. Membership is open to all undergraduate chemical engineers.

American Institute of Industrial Engineers

The objective is to promote the profession of industrial and systems engineering through the organized effort of this group in study, research and discussion.

American Marketing Association

The Marketing Club is open to all students having an interest in marketing and/or a desire for a career in marketing after graduation. Membership provides full affiliation with the national American Marketing Association and a subscription to the Marketing News, a twice monthly marketing trade publication. Meeting and other club activities are directed primarily toward career development for marketing club members; guest speakers for club meetings are selected for their potential contribution to job seeking and career development.

American Society of Civil Engineers (ASCE)

The purpose of the ASCE Student Club is to promote the profession of civil engineering among students through organized programs and projects. Professional and community oriented activities provide an opportunity for students to learn the meaning of professionalism. Scheduled meetings include speakers, field trips, and social activities.

American Society of Mechanical Engineering (ASME)

The purpose of ASME is to aid mechanical engineering students in their personal and professional development. Membership is open to all engineering students. Activities include speakers, business meetings, projects, field trips, and social activities.

Art Club Focal

The purpose of Art Club Focal is to (a) foster a wider student interest and participation in the arts, (b) encourage community interest and involvement in the art activities at UAH, and (c) promote a broader scope of education through extra-curricular activities such as field trips, workshops, lectures, and films.

Association for Computing Machinery (ACM)

The Student Chapter of the ACM is a technical organization for all students interested in Computer Science. The purposes of the club are to assist the student in his or her professional development as a computer scientist, to promote good fellowship among students and faculty in Computer Science, and to provide for contact between students and representatives of both industry and graduate research institutions.
Association of Nursing Students
The purpose of this Association is to provide a means to aid nursing students in realizing professional goals and to provide interaction and fellowship among clinical and proclinical nursing students. Any student enrolled in nursing at the university is eligible for membership. Through this organization, students participate in local projects, social activities, and programs as well as those of the state and national nursing student's associations.

Ballroom Dance Club
The purpose of the club is to foster a wide student interest and participation in ballroom dance, to offer students of HPE ballroom dance classes an appropriate time and place to practice and develop skills acquired in those classes, and to assist students in further developing dance skills and leadership skills.

Baptist Student Union
The Baptist Student Union exists for the purpose of providing an outlet for Christian expression, discussion, and study. Membership in the BSU is open to any University student. Its student center is adjacent to campus on Sparkman Drive.

Biology Club
The objective of the Biology Club is to promote interest and research in biological sciences. Any person enrolled as a full-time or part-time student and interested in biology is eligible for membership. The meetings are called by the president. Activities are aimed at giving the members a first-hand look at science in its natural environment and include field trips, lectures, and films. The club also offers aid on research projects.

Black Student Association
The goals of the Black Student Association include promoting unity and black cultural awareness among students, encouraging students to participate in all campus activities, promoting race relations among students at UAH and fostering the needs and interests of minority students.

Boost Alcohol Consciousness Concerning the Health of University Students (BACCHUS)
BACCHUS promotes the idea of students having good times and fun without the excessive use of alcohol. It is a national organization with over 335 chapters at colleges and universities across the country. The BACCHUS movement aims to empower students to make healthy decisions for themselves.

Business Council
The Business Council is comprised of the Presidents and Vice Presidents of all the business clubs with the Dean and the Assistant Dean of the College of Administrative Science acting as advisors. The Business Council conducts a job fair for prospective graduates each year. Social events and programs of interest to students in all business fields are provided.

Campus Ministry Association (CMA)
CMA is a collection of faith groups which provides responsive ministry in and with the UAH community. The Association's primary focus is the enrichment of the University experience among students, faculty, and staff. For more information call 551-0257.

Chemistry Club
The Chemistry Club promotes an awareness of the science of chemistry among students at UAH. Members learn about current research in chemistry, and also about career opportunities in chemistry and those professions which depend upon chemistry. Activities include speakers,
field trips and social events. Membership is open to all graduate and undergraduate students interested in chemistry. For more information call the Chemistry Office, 895-6153.

Chinese Student and Scholars Association from Mainland China
The purpose is to promote the mutual understanding among people with different cultures.

Chinese Student Association from Taiwan
The goals of the Chinese Student Association is to introduce students to American culture and to provide social activities.

Christian Students Organization
This organization was founded to promote spiritual growth and development among college students.

Circle K
Circle K is composed of students who wish to become actively involved in community concerns via service projects and activities. Circle K members express their care by assisting the elderly, the underprivileged, and the UAH campus. Sponsored by the Huntsville Metropolitan Kiwanis Club. Weekly meetings.

Collegiate Republicans Club
The College Republicans foster and encourage the activities of the Republican Party, assist in the election of Republican candidates to local, state and national office and formulate and administer programs aimed at involving college students in the Republican party.

Compass Club
This club is a leadership and character building student group which serves the campus and the community.

Data Processing Management Association (DPMA)
The DPMA Student Chapter program is designed for students planning careers in information processing or related fields. Student Chapters provide students with opportunities to exchange information with members of the information processing community and to explore various career opportunities. To be eligible for membership, students must be pursuing a major in either MIS or Computer Science.

English Language Forum
A student organization to foster study of the English language and teaching of English as a second language.

Financial Management Club
Membership in the Financial Management Club is open to any student interested in a career in Finance, including Real Estate, Insurance, Banking, Investments, and Financial Management. The club is devoted to the professional development of its members and to fostering improved relationship among students, faculty, and professionals in the several areas of finance.

French Club – "Le cercle francais"
The purpose of Le Cercle Francais is to promote understanding and appreciation of the culture of France and francophone countries throughout the world (Belgium, Canada, Switzerland, Black Africa, Haiti). The Club also tries to further French studies among UAH students. The club meets once a month in a social milieu for specific programs and discussions.
Forensic Club
The Forensic Club offers highly motivated students the opportunity to study and participate in intercollegiate CEDA-style debate, as well as various on-campus debating activities. Membership is open to all students, and interested persons should contact Communication Arts, Morton Hall (895-6645) early in the academic year.

General Union of Palestine Students
The purpose of the General Union of Palestine Students is to unite the students of the Middle east into a club to communicate socially and intellectually with other University clubs in order to promote friendship and understanding between cultures.

German Club
The German Club wants to promote interest in the usage and study of the German language, in the cultures and literatures of the German-speaking countries, Germany, Austria, Switzerland, and in international exchange and understanding. The membership is open to all faculty, staff, and students of the various disciplines. The club meets once a month for specific programs, and for more informal activities at additional times.

History Forum
The History Forum sponsors a series of lectures in the winter semester each year. The Forum invites distinguished speakers from across the United States and abroad to speak on historical topics of current interest. The Forum is a student-faculty group organized with student officers supported by history department faculty members. It is open to all members of the University community.

Indian Student Organization
The purpose of this organization is to promote friendship and understanding among students from India.

Institute of Electrical and Electronic Engineers (IEEE)
The Student Chapter of IEEE is a technical/professional organization for students in Electrical Engineering. Monthly meetings feature guest speakers, films, projects, or facility tours acquainting members with various aspects of electrical engineering. Membership is open to all undergraduate and graduate students in Electrical Engineering who are at least half-time students.

International Student Organization
The International Student Organization was established to foster friendship and understanding among students from various nations and cultures. It provides a basis whereby international students can share their knowledge about their native cultures with groups in the university community and with the general public. In addition, the organization offers assistance to recently arrived students from nations other than the United States. Regular membership is open to any individual currently enrolled at UAH, including the Division of Continuous Education. Associate membership is open to anyone who believes in the purpose of the organization and wishes to help it obtain its goals. For more information call 895-6750.

Japanese Language Club
The purpose of the Japanese Club is to create an environment in which UAH students of the Japanese language, culture and heritage meet together and with the UAH community and the general public to share information about Japanese and American cultural patterns.
Karate Club
The objectives of the Karate Club are to promote the sport of Karate, to create opportunities for students to compete, and to increase campus awareness of self-defense. Seminars and training workshops are presented for the benefit of the club members. Membership is open to all students who are or who have been exposed to the martial arts.

Korean Students Association
The purpose of this organization is to promote mutual friendship and solidarity among Korean students at UAH and to give other students a better understanding of Korean culture and history.

Lancers
Outstanding students are selected each year for their leadership, achievements and public relations skills to serve as the official student representatives of the University. The men and women who serve as Lancers introduce UAH to many exciting visitors and play an important role in assisting with events on and off campus. Faculty, staff and other student organizations can call on the Lancers for help with activities that benefit UAH. For more information about joining the Lancers or requesting their assistance, contact the Office for University Advancement.

Mathematics Club
The purpose of the Mathematics Club is to increase the influence of the University in mathematics and its applications, to promote good fellowship, and to offer services to students and faculty in the field of mathematics. The group is open to all students, and meetings are held monthly during the academic year.

Medical Careers Club
The Medical Careers Association is for students who intend pursuing a career in the health field, which includes premedical and predental students as well as those in nursing and allied health sciences. The purpose of the association is to help its members fulfill the entrance requirements of the various professional schools across the nation and to acquaint them with opportunities in the health fields. Interviews with and lectures by admission officers of professional schools, programs about the latest advances and opportunities in the health fields, and guidance in the selection of courses of study are some of the services provided by the association.

Medical Student Association
The Medical Student Association was created to provide a forum for the members of the School of Primary Medical Care. This organization seeks to develop opportunities for personal growth and to foster an atmosphere of mutual respect between students and community.

Model United Nations Club (Political Science)
The purpose of the UAH Model United Nations Club is to assist all UAH students in all disciplines in achieving greater understanding of international affairs and organizations, to learn skills in public speaking and debate, to study the functions of the United Nations, to provide members of the club and the University Community with information and programs of interest, and to help students to participate in the Annual Deep South Model United Nations sponsored by Auburn University and to participate in other Model United Nations meetings where appropriate.
Music Educators National Conference
This organization seeks to acquaint its members with the music profession and to work to increase interest, knowledge, and productivity in all areas of music education.

Muslim Student Association
The purpose of this organization is to promote unity and joint action among the Muslims, to conduct social, cultural, religious and other activities in the best traditions of Islam, to arrange and hold congregational prayers and Islamic religious festivals at appropriate times, to promote friendly relations among Muslims and non-Muslims, to endeavor to make Islamic teachings known to interested non-Muslims, and to provide needed general guidance and/or assistance to Muslims coming to the community.

National Association of Accountants (NAA)
The National Association of Accountants is a professional organization whose purpose is to promote excellence in management accounting. Monthly meetings of the North Alabama Chapter feature guest speakers on various accounting/business topics. UAH accounting students are eligible for student memberships for a special reduced fee. Through interaction with NAA members, students learn about career opportunities in management accounting.

National Association of Business Economists Student Chapter
Students enrolled in business economics or related fields are eligible for student membership in the National Association of Business Economists, the largest association of economists connected with private business. One of the purposes of the national association is to illuminate the contribution which trained economists can make in the business firm. The purpose of the UAH chapter is to provide a forum for social and professional exchange between students, faculty and the national association.

National Society of Black Engineers
The objectives of the National Society of Black Engineers are to stimulate and develop student interest in engineering; to promote participation at all levels of responsibility in the field of engineering by the black and ethnic minority communities; and to advance the black professional engineer within the individual engineering disciplines.

Phi Beta Lambda
Phi Beta Lambda is national organization for college students preparing for careers in the fields of business, office and business teacher education. Members receive Tomorrow's Business Leader, the official magazine of FBLA-PBL. It contains career tips and the latest FBLA-PBL news from across the nation. PBL provides a variety of activities for its members, from professional workshops to picnics and field trips. PBL also takes a stand in the community by helping charity and health organization.

Political Science Club
The purpose of the Political Science Club is to promote interest in politics and policies at the domestic and international levels, and to provide an opportunity for faculty and student interaction. The club holds regular business meeting and discussions. Past activities have included lectures, symposiums involving the Huntsville community, and various social events.

Public Relations Council of Alabama Student Chapter
The Public Relations Council of Alabama Student Chapter is open to all students who have a sophomore level standing. The objectives of the club include increasing communication between the schools on campus and publicizing these schools. There is a minimum of four
meetings per year which are randomly called by the president. The club interacts with the Huntsville PRCA Chapter regularly.

Resident's Advisory Council
The purpose of the Resident's Advisory Council is to encourage the intellectual, social, cultural and recreational growth of students residing in University Housing.

Rowing Club
The purpose of this club is to provide rowing experiences and to support the university's rowing team. The group encourages both the competitive and recreational rowing sport. Membership is open to all interested individuals. Rowing opportunities are available most Saturday and Sunday mornings.

Slovo-Slavic Club
The Slovo-Slavic Club is for students who wish to further their understanding of Slavic cultures. Although the emphasis is on Russia, the whole spectrum of Slavic nations is studied. At club gatherings, the members use various media to investigate different facets of their interests.

The Society of Physics Students
The Society of Physics Students promotes contact between fellow students and faculty and provides a medium for interaction with the local physics community and other universities. Students in SPS pay minimal national dues and receive Physics Today. Any interested student may join.

The Society of Women Engineers
The Society of Women Engineers is a professional, non-profit educational service organization set up to inform women of the opportunities available to them in industry. The Society encourages all math, science, and engineering students to meet monthly and share in the many experiences that other women in technology have had. It provides students with a chance to socialize, a chance to mingle and interact with company representatives and, thus, it provides a headstart towards becoming a true professional.

Spanish Club - "La tertulia"
The purpose of the Spanish Club is to provide an opportunity for friendship and association among students interested in the Spanish language and Hispanic culture; to promote understanding and appreciation of Hispanic culture - literature, art, music, drama, history, geography, politics, and economics; to encourage the study of the Spanish language; and to contribute to the advancement of intercultural relations and international understanding.

Student Alabama Education Association
The UAH chapter of the student AEA is for students who plan to be educators. One of the association's purposes is to involve students in the issues and processes of education before they begin their careers. Any undergraduate education student may join.

Students for the Exploration and Development of Space (SEDS)
The Students for the Exploration and Development of Space educates the students and the general public about the benefits of space exploration and development. The organization also provides a forum for the discussion and exchange of ideas related to the exploration and development for space.
Students over the Traditional Age (SOTA)

The Students Over the Traditional Age club’s purpose is to promote the exchange of knowledge and experiences among students twenty-five or older.

World Issues Society

It is the purpose of the World Issues Society to promote an interest in the study of sociology, research of social problems, and such other social and intellectual activities as will lead to improvement in the human condition.

Greeks

Interfraternity Council (IFC)

IFC serves as the governing body of the five fraternities at UAH in order to develop cooperation and coordination of activities among the member fraternities. The five national social fraternities on campus are Alpha Tau Omega, Delta Chi, Kappa Alpha Psi, Pi Kappa Alpha and Sigma Nu. For more information contact the Interfraternity Council Advisor at 895-6445.

Panhellenic Council (Panhel)

The Panhellenic Council is the organization which coordinates sorority activities at UAH. The five Social sororities available to young women at UAH are Alpha Kappa Alpha, Chi Omega, Delta Sigma Theta, Delta Zeta, and Kappa Delta. For more information contact the Panhellenic Advisor at 895-6445.

Academic Honor Societies

Administrative Science Honorary

The Administrative Science Honorary is for students majoring in one of the disciplines of the College of Administrative Science. Its purpose is to recognize, promote, encourage, and maintain academic excellence and to provide an opportunity for personal growth through participation with the academic community and professional involvement beyond the classroom. Standards for membership are completion of 60 semester hours (the last 30 at UAH), a cumulative grade point of 3.5 or above, and recommendation by a member of the Administrative Science faculty.

Alpha Epsilon Delta (Pre-Health)

The UAH chapter of Alpha Epsilon Delta, the national pre-health professional honor society, was established on campus in the fall of 1978 and was chartered in the spring of 1979. Membership in Alpha Epsilon Delta is an honor bestowed in recognition of superior scholarship achievement and affords the student an opportunity to develop initiative, leadership, and self education by participating in the activities of the chapter.

Alpha Kappa Delta (Sociology)

The Epsilon of Alabama chapter of Alpha Kappa Delta was chartered by the National Sociology Honorary Society in the Spring of 1976. It thus became the fifth chapter of this society in this state. Membership in AKD is limited to students who have maintained a high standard of excellence in their courses of study in sociology and who show serious interest in this academic field. The candidate for membership in the chapter must be a Junior with an overall GPA of 3.0, must maintain a 3.0 GPA in sociology courses taken at UAH, and must have completed at least 4 regular courses in sociology prior to initiation. Election to AKD shall be without regard to race, creed, sex, or national origin.
Alpha Lambda Delta (Freshman)
The UAH chapter of Alpha Lambda Delta, national scholastic honor society for freshmen, was installed in the fall of 1974. The purposes of the society are to encourage superior scholarship attainment among students in their first year in institutions of higher education, to promote intelligent being and a continued high standard of learning, and to assist students in recognizing and developing meaningful goals for their roles in society. To become a member, a student must earn a scholastic average of 3.5 during the first, second, or third quarter of enrollment.

Alpha Psi Omega (Theatre)
The Xi Theta cast of Alpha Psi Omega was established at UAH in 1983 and chartered in 1984. Alpha Psi Omega is the national theatre honorary whose purposes are to recognize those students who have achieved a high standard in dramatic arts and to provide a wider fellowship for those interested in the theatre. Membership is earned through work in University-sponsored theatre activities and is open to students of any major.

Eta Kappa Nu (Electrical Engineering)
The Theta Eta (UAH) Chapter of Eta Kappa Nu was chartered on April 29, 1978. The objectives of Eta Kappa Nu are to honor those students of Electrical Engineering who have excelled in scholarship, leadership, and exemplary character and to unify them with graduates and faculty who have attained prominence in the field of Electrical Engineering. Membership is open by chapter invitation only to graduates, faculty, professionals, juniors in the top fourth of the electrical engineering class, and seniors in the top third of the electrical engineering class.

National Management Association
The student chapter of the National Management Association is an honorary organization offering membership to any student in the College of Administrative Science. Membership requirements are minimum of a 2.7 grade point average and an interest in the field of Management as a primary function or as an auxiliary function to some other area of Administrative Science.

Omicron Delta Epsilon (Economics)
The objectives of Omicron Delta Epsilon, international honor society in economics, are recognition of scholastic attainment in economics, the honoring of outstanding achievement in economics, the establishment of closer ties between students and faculty in economics within and among colleges and universities, and the publication of the official journal, the American Economist.

Omicron Delta Kappa (Leadership)
The purpose of the Omicron Delta Kappa Society is to recognize individuals who have attained a high degree of leadership in collegiate and related activities, to encourage them to continue along this line, and to inspire others to strive for similar conspicuous attainment; to bring together representative individuals in all phases of collegiate life and thus create an organization which will help mold the sentiment of the institution on questions of local and intercollegiate interest; and to bring together members of the faculty and student body of the institution on a basis of mutual interest, understanding, and helpfulness.

Order of Omega
The Order of Omega organization is to recognize those students who have attained a high standard of leadership in inter-Greek activities, to bring together members of the faculty, alumni and student member of the institutions, fraternities and sororities.
Phi Alpha Theta (History)
UAH has a chapter of Phi Alpha Theta, international history, honorary society. Membership is open by invitation only to history students who have completed a minimum of 12 hours in history with a grade-point average of 3.5 and an overall average of 3.0 in all other courses.

Phi Delta Kappa
A number of faculty and staff members are actively involved in the Huntsville chapter of Phi Delta Kappa, national leadership fraternity in the field of education.

Phi Kappa Phi
The primary objective of the national honor society of Phi Kappa Phi is the recognition and encouragement of superior scholarship in all academic disciplines. The society is convinced that in recognizing and honoring those persons of good character who have excelled in scholarship in whatever field it will stimulate others to espouse excellence. Moreover, the society feels that it serves the interests of the student capable of excellence by insisting that to acquire a chapter of Phi Kappa Phi, an institution provide the atmosphere conducive to academic excellence.

Phi Sigma Iota (Foreign Language)
Phi Sigma Iota recognizes outstanding ability and high standards in the field of foreign languages, literatures, and cultures, including classics, linguistics, philology, comparative literature, bilingual education, and other related areas. It promotes international communication and understanding, and a sentiment of amity among nations. Membership is open by nomination to any UAH student who is at least a junior; has a B average overall, as well as in foreign languages; has completed at least one foreign language course at the 300 level; is enrolled at UAH at the time of being offered membership; and should take at least two 300 level courses in foreign languages.

Pi Kappa Delta (Forensics)
The purpose of this honor fraternity is to foster wide student interest and participation in collegiate forensics, to promote the development of self-esteem, leadership and communication skills and to honor students exhibiting these qualities.

Pi Sigma Alpha (Political Science)
Pi Sigma Alpha is the national honorary society for political science students with junior standing having a minimum of ten semester hours and a B average or higher in political science courses.

Pi Tau Sigma (Mechanical Engineering)
Pi Tau Sigma is the national Mechanical Engineering Honor Society. The purposes of Pi Tau Sigma are to foster the high ideals of the engineering profession, to stimulate interest in coordinate departmental activities, to promote the mutual professional welfare of its members, and to develop in students of mechanical engineering the attributes necessary for effective leadership. Eligibility extends to the top quarter of the juniors and the top third of the seniors in mechanical engineering.

Psi Chi (Psychology)
Psi Chi is a national recognition society for students in the field of psychology. The purposes of Psi Chi are to encourage, stimulate, and maintain scholarship of the individual members
in all fields, particularly in psychology, and to advance the science of psychology. To achieve these goals Psi Chi offers a wide range of programs at the local, regional, and national levels. The requirements for admission are a 3.0 overall grade-point average and a 3.0 in psychology, and 12 hours of psychology for a minor or 15 hours for a major.

Sigma Pi Sigma (Physics)
The Sigma Pi Sigma honorary society operates within the Society of Physics Students. Membership is based on general scholarship. An overall GPA of 2.75 and a GPA of 3.2 in at least 5 courses in physics are required for membership in Sigma Pi Sigma.

Sigma Tau Delta (English)
The UAH chapter of Sigma Tau Delta, a national English honorary society, is Upsilon Mu. Its purposes are to assist in developing, maintaining, and promoting literary and educational activities for the students and the alumni of the chapter, as well as the entire University and civic community. Membership is open by chapter invitation only to English majors and minors of junior standing who have a 3.0 grade-point average.

Sigma Theta Tau (Nursing)
Sigma Theta Tau is the international honor society of nursing. The purposes of Sigma Theta Tau include the recognition of superior achievement and leadership qualities, the fostering of high professional standards and creative work, and the strengthening of the individual's commitment to the ideals and purposes of the nursing profession. Invitation to membership may be extended to junior and senior nursing students who have completed at least one-half of the required nursing component with a grade point average of 3.0. Graduate students in nursing who have completed one-fourth of the required graduate curriculum may be eligible for membership with a grade point average of 3.3.

Tau Beta Pi (National Engineering Honor Society)
The Tau Beta Pi Association was founded at Lehigh University in 1885 to mark in a fitting manner those who have conferred honor upon their Alma Mater by distinguished scholarship and exemplary character as students in engineering, or by their attainments as alumni in the field of engineering, and to foster a spirit of liberal culture in engineering colleges. Scholastic requirements include: class standing of the top eighth of the junior class or the top fifth of the senior class and demonstration of exemplary character.

Upsilon Pi Epsilon (Computer Science)
Our Computer Science Honor Society is for both graduates and undergraduates.

Music Organizations
All musical organizations are open to all students, music and non-music majors. A student should be able to make a place for himself in some performing group, regardless of his musical background and tastes. Credit is offered for most ensemble experience, and participation may be repeated with approval of the conductor.

Choral Organizations UAH Choir
The choir performs choral literature of the great masters of music history as well as folk music of various countries. Attendance at all rehearsals and performances is required. Audition with conductor is required.

Huntsville Symphony Orchestra
The Huntsville Symphony Orchestra, a semiprofessional blend of University and community talent, prepares six formal concerts each year. Four international artists perform with each
annual concert series. The orchestra rehearses Monday and Friday from 7:30 to 10:00 p.m. Audition with conductor is required. Attendance at rehearsals and performances is also required.

**UAH Jazz Ensemble**
A workshop experience providing students with instruction in jazz arranging and composition and in improvised jazz is stressed. Attendance at rehearsals and performances is required. Audition with instructor is also required.

**UAH Wind Ensemble**
A select group of experienced bandsmen who perform the best available music literature for wind ensemble and concert band. The ensemble rehearses Wednesday from 7:00 to 9:30 p.m. Attendance at all rehearsals and concerts is required. An audition with the conductor is also required.

**UAH Pep Band**
The Pep Band is a musical organization of students that promotes spirit and enthusiasm at a variety of athletic events. Members and scholarship recipients are chosen by audition and may elect to enroll in the group for class credit.

**Intercollegiate Athletics**
UAH currently sponsors intercollegiate athletic programs in men’s and women’s basketball, crew, tennis, soccer, hockey, and women’s volleyball. Participation in these programs is open to any qualified student. Intercollegiate teams are affiliated with the National Collegiate Athletic Association (NCAA) and the Southeastern Athletic Association.

**Basketball (Men)**
The UAH men’s basketball team is entering its 17th season this year. During this time, the sport has advanced from NAIA to NCAA Division II, creating a higher level of competition with each move. The Charger team of the late-80’s has a new look. This look includes a new coaching staff, outstanding recruits and new opponents. The newly conceived Mayor’s Classic has become a yearly event as the Chargers meet Alabama A&M for the city title each year.

**Basketball (Women)**
In 1977, UAH introduced women’s basketball to its list of collegiate sports. Like the men’s program, the women’s team has advanced to NCAA Division II competition. The women’s team has finished as high as runner-up in the NAIA national championship tournament. The Lady Chargers produced nationally recognized NCAA II athletes, such as second string All-American Annette Fletcher. The Lady Chargers are gaining in number and strength each season. They also compete at the annual Mayor’s Classic held at the Von Braun Civic Center.

**Soccer (Men’s)**
The Charger soccer team distinguished itself nationally when it competed in the NAIA. The team qualified for the NAIA national tournament nine times, advanced to the final eight a total of six times and finished as high as second (1978). The team now competes on the NCAA Division II level, and plays a schedule that includes other nationally-ranked teams.

**Hockey (Men’s)**
The UAH Hockey program began as a Charger club team in 1978. This club team won three consecutive Central States Collegiate Hockey League titles, and the 1980 national title. The team advanced to NCAA Division II, where they continued their winning tradition. In 1987, the team advanced into NCAA Division I competition and Huntsville was named the Hockey...
Capital of the South. As a Division I team, the Chargers compete against hockey powers such as Notre Dame, Maine, Alaska-Fairbanks, and Wisconsin.

Volleyball (Women’s)
The UAH volleyball team was established in 1986. Although still a young program, the team’s strength is developing. The Lady Chargers compete against teams throughout the South, including the University of North Carolina-Asheville and Florida Atlantic University.

Tennis (Men’s and Women’s)
The Tennis program was re-established in 1986 after 3 years of inactivity. The second beginning was as an NCAA Division II team. Last year’s women’s varsity team won the SAA Championship Title.

Crew (Men’s and Women’s)
The crew program went varsity in 1985 after being a club sport for almost twenty years. After three years on the varsity level, the two man heavy weight won national recognition when it won the first national championship ever for UAH in the Dad Vail Regatta.

Intramural Sports Program
The intramural sports program serves the recreational needs of UAH students through a planned program of intramural athletics and other forms of recreational activities. It provides opportunities for the development of positive attitudes toward recreational activities throughout life, thus deriving optimum benefits of enjoyment, health, social contacts, and sportsmanship. The philosophy of intramural activities at UAH is based on the concept that students should have freedom of choice and responsibility for sharing in planning, supervising, and administering the program.

All students and members of the faculty and staff are eligible to participate in intramural activities. The team sports include basketball, flag football, softball, and volleyball. The individual sports which are offered are bicycling, horseshoes, golf, bowling, racquetball, swimming, table tennis, tennis, and weightlifting.

Cheerleaders
The UAH Cheerleading Squad has 16 members. The primary purpose of the cheerleaders is to promote spirit, enthusiasm, and support for intercollegiate athletics on the campus. Squad membership is determined by a panel of judges during clinic and tryout sessions conducted each spring and sometimes in the fall. All cheerleaders must be students who are currently enrolled at UAH and must maintain a minimum of a 2.0 (C) grade-point average.

Mascot
The UAH Charger Mascot promotes spirit, enthusiasm and support for intercollegiate athletics and the University. This person must be a student who is currently enrolled at UAH and must maintain a minimum of a 2.0 (C) grade point average.

Pep Band
The UAH Pep Band is a musical organization of students that promotes spirit and enthusiasm at a variety of athletic events. Members and scholarship recipients are chosen by audition and may elect to enroll in the group for class credit.
Pep Club
The Pep Club promotes spirit among all UAH intercollegiate athletics for students, staff, and alumni. Activities include half time events and pep rallies.

Student Publications
The Exponent, is the UAH student newspaper. The paper is published weekly except during exams and holidays. The Exponent office is located in Room 104 of the University Center, telephone: 895-6090. The Publications Board, a joint faculty-student board, is responsible for the policies, planning, (selection of editors) coordinating and overseeing of the Exponent and the student publications under its jurisdiction.

Shadows is an art and literary magazine. Shadows is the printed campus forum for art and literature which is sponsored by the Publications Board. All UAH students are eligible to submit their work for publication in Shadows. Anyone wishing to submit art or literature for consideration for the next issue, can bring or mail their work to the Exponent office, Room 104, University Center.
Admissions Information

The University of Alabama in Huntsville welcomes inquiries and applications from interested persons who wish to further their education. The student body is composed of individuals of all ages—traditional full-time college students and other adults who are combining their educational pursuits with work, family, and various activities. Prospective students should apply well in advance of the date of proposed entrance.

Application forms, detailed application instructions, and information brochures are available at the Office of Admissions in the University Center. A copy of the UAH catalog is mailed to each new student upon admission to the University; additional copies are available for purchase in the UAH bookstore.

Information for prospective students is available through the Office of Admissions. Campus tours on an individual or group basis are available (phone 895-6070). Faculty members and academic advisors (phone: 895-6290) are eager to confer with interested individuals to discuss their enrollment plans and opportunities at UAH.

Undergraduate Admissions Information

Admission policies at UAH provide for a diversity of educational backgrounds. Admission procedures accommodate:

- students who are seeking degrees (Degree Bound) and
- those who have no immediate degree plans (Nondegree Students)
- and have never attended any college (freshmen)
- those who are transferring from one or more previous colleges (transfers)
- students who are currently in their senior year of high school and
- students who are fully qualified (Regular) and
- students who are presently in high school and are academically talented and who wish to enroll concurrently in courses at UAH (Early Start Program)
- students who have already earned a baccalaureate degree and are seeking another baccalaureate degree (Second Bachelor's Degree) or
- those who are taking courses on a nondegree or preparatory basis for graduate school (Nondegree postgraduate, i.e., NPG)
Eligibility for Admission as a Regular Student

Admission as a regular student is based upon high school and previous college performance, if applicable as well as scores on specified tests. See table below.

Required Application Materials

<table>
<thead>
<tr>
<th>Classification</th>
<th>Application Forms</th>
<th>$20 fee*</th>
<th>High School Transcripts</th>
<th>ACT Scores</th>
<th>GED Scores</th>
<th>College Transcripts</th>
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<td></td>
<td>1 copy from each institution attended</td>
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International see pages 33 and 34.

*Nonrefundable

High School Graduates

High school graduates may be admitted as regular freshmen on the basis of acceptable high school records and scores achieved on the American College Testing (ACT) program examinations (SAT accepted as substitute for ACT). The two factors of grades and scores are considered together. Higher results in one area are able to offset lower performance in the other. For example, an applicant who earns an ACT score of 22 must have at least a 2.25 average high school academic units in order to qualify for admission. See the chart below for further definition.

High School Grade Point Averages and ACT Scores Required for Regular Admission to the Freshman Class

<table>
<thead>
<tr>
<th>If Act score is (Enhanced ACT)</th>
<th>If SAT score is</th>
<th>Then for Regular Admission Minimum High School Grade Point Average in Academic Units Must Be</th>
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<tr>
<td>17 or below</td>
<td>750 or below</td>
<td>3.25                             Note: The College of Engineering requires a</td>
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<td>18</td>
<td>800</td>
<td>3.00                             Minimum ACT score of 21</td>
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<td>2.75                             or ans SAT score of 900</td>
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<td>900</td>
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<td>22</td>
<td>950</td>
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<tr>
<td>23</td>
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<tr>
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<td>1050 or above</td>
<td>1.15</td>
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</table>

30
Applicants should present a minimum of 20 Carnegie high school units. These should include:

- 4 years of English
- 3 years of Social Studies
- 1 year of Algebra
- 1 year of Geometry
- 1 year of Biology (recommended)
- 1 year of Chemistry/Physics (required by the College of Engineering and Science; recommended by all other Colleges)
- 1 year of Algebra II/Trigonometry (recommended by all Colleges; the College of Engineering specifies 1 year of each)
- Sufficient academic electives to meet the required 20 units

(The State of Alabama requires 3.0 units of Physical Education and 0.5 units of health)

Current high school students will find it to their advantage to follow the advanced diploma curriculum. Students who plan to major in programs in the College of Administrative Science should refer to the College’s section in the catalog for more information on high school preparation.

Prospective freshmen currently attending high school should apply during their senior year in high school. Tentative admission will be granted on the basis of ACT (or SAT) scores and high school records through the junior year. Work completed in the senior year and confirmation of graduation will be reviewed before a student’s final admission.

Applicants having deficiencies in the required high school courses may be admitted in good standing. The deficiencies, however, must be removed during the first year of enrollment in a manner approved by the department concerned. Courses taken to remedy entrance deficiencies cannot be used to satisfy degree requirements.

High school graduates who have never attended college and who have been out of high school five or more years do not need to submit ACT test scores.

General Education Development (GED) Recipients

Persons who have not graduated from high school may be admitted on the basis of a satisfactory score on the GED test. A score of 50 is required for regular admission status. UAH is a testing center for the GED program. Anyone seeking additional information or wishing to take the GED examination should contact the Office of Testing Services (895-6725).

Early Start Program

UAH welcomes inquiries from academically talented high school students who wish to enroll in courses for college credit during the summer term between their junior and senior years of high school or concurrent with their senior year in high school. For detailed information, such students should see their high school counselors or personnel in the Office of Admissions.

Transfer Students

Students who have previous academic records at a college or university level may be admitted to UAH as transfer students. The high school transcript of a transfer student will be reviewed for completion of required units, and deficiencies, if any, will be noted on the admission certificate. Admission to the College of Engineering is an independent action from admission to the University. A student who is currently on suspension from another college or university is not eligible for enrollment until his suspension period has terminated.

Once a student has enrolled and has accumulated a total of 64 semester hours of credit from all sources no additional credit may be transferred to UAH from a two-year institution. Excep-
tions to this policy must be approved prior to taking additional course work. Requests for exceptions must be in writing and approved by the UAH chairperson of the department where th course is taught, and by the dean of the college in which the student is enrolled.

Transfer students seeking admission to the College of Administrative Science are admitted with a pre-business classification (code 07) and remain in this classification until they are admitted to the Upper Division of the College. Transfer students who intend to pursue the BSBA degree should read carefully the College’s section on, “Admission as a Transfer Student” and “Admission to the Upper Division”.

Students Transferring from Other Institutions

A prospective transfer student who has attempted fewer than 18 semester hours of work at an accredited college or university and who has at least a 1.0 average on a 4.0 scale will be considered for admission on the basis of high school grades and ACT scores.

Applicants with previous records showing 18 semester hours or more of work attempted at accredited colleges or universities must have a minimum overall C (2.0) average on all work attempted in order to qualify for regular admission.

Evaluation of Transfer Credit

Transfer admissions decisions will be based on a full evaluation of transcripts from all colleges and universities attended. Transfer credit evaluations will be completed before or during the first term of enrollment.

Credit hours and quality points associated with courses in which the subject matter is not acceptable at UAH will be disregarded when determining admissibility and status at UAH and will thus be excluded from calculations of hours attempted and overall grade point average.

In instances where disallowance of courses reduces the total number of hours of acceptable credits below 18 semester hours with at least a 2.0 average on a four point scale, the applicant will be considered for admission on the basis of high school grades and ACT scores.

Transferred courses in subject matter accepted by UAH with grades of less than C will not be awarded credit but will be utilized in calculating the grade point average for admission criteria and will be included in hours attempted and overall grade point average.

Catalog for Transfer Students

A student transferring from an Alabama junior college may choose to fulfill the degree requirements of the UAH catalog which was in effect at the time of the student’s initial enrollment at the Alabama junior college, provided that the date does not exceed the seven year limit. See time limits section of the catalog. This policy enables students enrolled at Alabama junior colleges to effectively plan degree programs and to be assured that degree requirements specified for UAH students will be equally applicable, within specified limits, to transfer students. UAH participates in the Alabama Articulation Agreement. Students intending to transfer to UAH from Alabama junior colleges are encouraged to consult with their advisors when planning their programs of study.

An individual who enrolls as a non-degree student and later decides to work toward a degree must request an evaluation of transfer credits. The application of such accepted credits to a particular program of study will be made and approved at the time of official determination of the individual’s program of study.

Acceptance of credit and application of credits to a specific degree program are two separate and distinct processes. Consult an academic advisor for degree applicability within the desired degree program.

Credits earned in quarter hours will be converted to semester hours on the basis of two-thirds of one semester hour for each quarter hour.
A maximum of 64 semester hours of credit from a junior college may be applied toward a degree. Exceptions to the 64-hour maximum must be justified and approved in writing by the dean of the school in which the student is enrolled.

The University of Alabama in Huntsville follows the practices specified in Transfer Credit Practices of Selected Educational Institutions, published by the American Association of Collegiate Registrars and Admissions Officers, in evaluating college level courses from other recognized colleges and universities for the purpose of transfer of credit to UAH.

If the previous record was earned at an institution not holding regional accreditation, a decision on acceptance of credits will be made on an individual basis. If credits are accepted, they will be classified as provisional. Full credit for a provisional credit will be based upon performance during the first 30 semester hours attempted at UAH. In order to receive full credit for provisional credit, a student must earn a C or better in each course attempted during the first 30 hours. Each student with credits in this category should see the registrar concerning his status at the end of the term in which he has completed his first 30 semester hours at UAH.

Credit for engineering courses taken at schools accredited by the Accrediting Board for Engineering and Technology (ABET) is transferable to UAH. Engineering courses taken in non-ABET accredited institutions may also be applied toward a BSE degree based upon an appropriate examination (written or oral) at the discretion of the respective department. All inquiries concerning applicability of credit should be made to the UAH Engineering Department chairman where the course, or its equivalent, is being taught.

Credit for Business Administration courses taken in schools with American Assembly of Collegiate Schools of Business (AACSB) accredited programs is transferable to UAH. Credit in courses taken in programs without AACSB accreditation may be accepted with approval of the Dean of the College of Administrative Science. Transfer credit will be granted for administrative science courses only with a “C” or better. This policy applies to students entering or re-entering UAH after Winter 83-84. All inquiries concerning applicability of transfer credit should be made to the Office of Academic Assistance, College of Administrative Science, (205) 895-6024.

Admission of International Students

International students are expected to meet all established requirements for admission from secondary schools or from other colleges and universities. All international applicants must apply for admission at least three months in advance of desired attendance date.

Admission Requirements

An undergraduate applicant must submit:

1. Completed application form.
   In addition, the student must request that:
3. Official copies in English of secondary school and college or university transcripts be forwarded to the University of Alabama in Huntsville directly from the institution(s) attended. Do not send personal copies.
4. American College Test (ACT) scores be sent directly to UAH from ACT headquarters. (ACT is not required of an applicant who has earned more than 18 semester hours of college work or was graduated from high school more than five years ago.) (SAT may be used as a substitute for the ACT.)
5. Scores from the Test of English as a Foreign Language (TOEFL) be sent directly to UAH from Educational Testing Service. A minimum score of 500 is required.
6. A certified financial statement be submitted as evidence of sufficient finances to cover his university and personal expenses while attending UAH.
Evidence be presented of University-approved health insurance coverage. Proof of continued coverage must be presented by the student each term he is enrolled. Individuals in the U.S. on a student visa who are transferring from another college or university in the U.S. must show evidence of release from the previous program by the international student advisor at their previous school. Transfer students must have completed the equivalent of one academic term at those institutions before admission to UAH.

A graduate applicant must submit:
1. Completed application form.

In addition, the student must request that:
3. Official copies in English of secondary school and college or university transcripts be forwarded to the University of Alabama in Huntsville directly from the institution(s) attended. Do not send personal copies.
4. Graduate Record Examination (GRE) or Graduate Management Admission Test (GMAT) scores be sent directly to UAH from Educational Testing Service. (See Graduate Admission.)
5. Scores from the Test of English as a Foreign Language (TOEFL) be sent directly to UAH from Educational Testing Service.
6. A certified financial statement be submitted as evidence of sufficient finances to cover university and personal expenses while attending UAH.

Non-degree Students
UAH provides simplified admission procedures for students who want to pursue their educational goals, but who have no immediate degree plans. These students, sometimes called "casual course takers," may choose to apply as special non-degree students. For information, call 895-6070.

Any adult who has completed high school or completed the GED with a minimum score of 50 may apply for admission as a non-degree student. Credits earned or courses audited as a nondegree student are recorded on the student's permanent record and will count if applicable in a regular undergraduate degree program when the individual qualifies for admission as a regular student.

A student enrolled in this category is subject to the same periodic review of his record as a regular student and is subject to the University’s regulations regarding scholastic probation and suspension. (See Academic Information.) If a non-degree student becomes subject to academic suspension, the suspension is for a minimum of one term, and the student must petition the Admissions Committee for approval to re-enroll.

A student enrolled as a non-degree student must satisfy course prerequisites for each course taken.

Conditional Admission for High School Graduates
An individual who has applied under the Regular Admission Plan and who does not meet the criteria for regular admission may be admitted to UAH as a conditional admit. The conditional admit will be required to carry a light course load until he/she has completed a total of 15 semester hours of work. If the student has achieved an overall C average at the completion of 15 or more hours of work, he will be admitted as a regular degree-seeking student. Credits earned as a conditional admit are recorded on the student’s permanent record and will count if applicable in a regular undergraduate degree program when the individual has qualified for admis-
A student enrolled in this category is subject to the same periodic review of his record as a regular student and is subject to the University's regulations regarding scholastic probation and suspension. (See Academic Information.) If a student becomes subject to academic suspension, the suspension is for a minimum of one term, and the student must petition the Admissions Committee for approval to re-enroll.

**Probational Admission for Transfer Students**

An individual who has applied and who does not qualify as a regular transfer student may be admitted on probation. A transfer student enrolled in this category is subject to the same periodic review of his academic record as a regularly admitted student who is on scholastic probation. (See Academic Information.) If at such a review point the student becomes subject to academic suspension, the suspension is for a minimum of one term, and the student must petition the Admissions Committee for approval to re-enroll.

**Re-Entry**

A student who has not attended UAH for one or more terms and who wishes to return should consult with the Office of Admissions to determine enrollment status and the conditions under which studies may be resumed.
Graduate Admissions
Information

Application Procedure
An applicant should submit a completed graduate application form (available in the Office of Admissions) and a nonrefundable application fee of $20. In addition, the student must request the following items be sent to the Office of Admissions:

1. Official copies of the academic record from each collegiate institution attended;
2. Scores of the Graduate Record Examination (GRE) from Educational Testing Service (ETS), scores of the Graduate Management Admissions Test (GMAT) for Administrative Science applicants, or either a set of GRE scores or a score of the Miller Analogies Test for Nursing and Public Affairs.

All application materials should be submitted to the Office of Admissions no later than dates specified in the UAH calendar.

Applicants should initiate admission procedures at least six weeks before the registration date of the term for which admission is sought.

An applicant for a Ph.D. program who has been previously admitted to the School of Graduate Studies must submit a completed re-evaluation form to the Office of Admissions. A student who has been admitted to a Master’s degree program and who wishes to be considered for a Ph.D. program or an additional Master’s program must submit a re-evaluation form to the Office of Admissions.

Admission Requirements

For unconditional admission to the School of Graduate Studies, applicants must hold a Bachelor’s degree from an approved institution. The following minimum requirements are acceptable to the graduate faculty; individual departments may require higher averages or additional requirements.

Unconditional Admission
Applicants may be admitted unconditionally if they have criteria A or B:

A. 1. A minimum average of B (GPA of 3.0) on the undergraduate record or on the last 60 semester hours, and
A. 2. a. A score of 1500 on the aptitude test (verbal, quantitative, and analytical) portion of the GRE;
   or
A. 3. b. A score of 50 on Miller Analogies Test for Nursing and Public Affairs.
B. For the College of Administrative Science, a minimum composite score of 950 based on the formula of 200 multiplied by the undergraduate GPA plus the GMAT score, i.e. (200 undergraduate GPA) + GMAT score.

Conditional Admission
An applicant whose scholastic record does not fully meet the requirements for unconditional admission may, upon recommendation of the department chairman and with approval of the graduate dean, be admitted on a conditional basis provided the applicant has taken the Graduate Record Examination, the Miller Analogies Test, or GMAT (for Administrative Science). The applicant must have a minimum of:

1. GPA of 2.5 overall, or QPA of 3.0 on the last 60 semester hours; or
2. Composite GRE score of 1500 or
3. MAT score of 50.
A student admitted on a conditional basis who has an overall grade average of B or better for all graduate work attempted up to and including the term in which 12 semester hours are completed at UAH assumes the status of an unconditionally admitted student.

Failure to remove conditional status by maintaining a minimum overall grade average of B or better on all graduate work attempted as described above results in dismissal from the School of Graduate Studies. In exceptional cases, a student may be readmitted upon justified recommendation of the faculty in the major department and approval by the graduate dean.

Residency

A determination of residency status is made at the time the student is admitted to UAH. In order for a change in residency status to be effective for any given term, such change must be accomplished no later than the first day of classes for that term. Contact the Admissions Office, Room 119, University Center, to apply for a change in residency status.

English Proficiency

Success in the graduate school is strongly dependent upon a well developed ability to communicate in English. A faculty member has the right to refuse written material submitted by a student if that material, in the opinion of the member, does not meet standards in English proficiency.

Students otherwise admissible to graduate studies but who have low verbal scores (less than the 25th percentile on a national standardized test such as: MAT 40, GRE Verbal 400, GMAT Verbal 20) must pass an English proficiency test, or pass a remedial English course within the first 12 hours of graduate study in order to continue in the graduate program.

International Student Admission

An applicant who is a graduate of a foreign institution is subject to the same criteria for admission as a graduate of a U.S. institution. The applicant whose native language is not English is required to take the Test of English as a Foreign Language (TOEFL) and score at least 500. An I-20 form (Student Visa) will not be issued by UAH until acceptable results of the TOEFL are received and all admission requirements met.

In addition, all international students must request that:
1. Two official copies in English of secondary school and college or university transcripts be forwarded to UAH directly from the institution(s) attended. Do not send personal copies.
2. Graduate Record Examination (GRE) or Graduate Management Admission Test (GMAT) scores be sent directly to UAH from Educational Testing Service.
3. Scores from the Test of English as a Foreign Language Test (TOEFL) be sent directly to UAH from Educational Testing Service. A minimum score of 500 is required.
4. A certified financial statement be submitted as evidence of sufficient finances to cover University and personal expenses while attending UAH.
5. Evidence be presented of University-approved health insurance coverage. Proof of continued coverage must be presented by the student during each term of enrollment.

Seniors Taking Graduate Courses

UAH seniors may take up to 9 hours of courses (500-level or above) for graduate credit while completing requirements for the baccalaureate if they meet the following qualifications:
1. An approved degree application on file;
2. An overall GPA or GPA for the last 40 hours of at least 3.5;
3. A total course load of no more than 12 hours a term;
4. Permission of the instructor for courses at the 600 level or above.
Students initiate the process by filling out the Request for Approval of Graduate Credit by UAH Senior (available at the Office of Registrar, Room 119, University Center) that requires the approval of the department chairman and graduate dean.

Unclassified Admission

Persons who desire graduate credits without pursuing one of the degree programs offered at UAH may be admitted as unclassified graduate students if the qualifications for conditional admission are met.

Credit earned under unclassified status may be applied toward a graduate degree program following admission to the graduate degree program and approval of courses by the major department.

Change in Major

A student previously admitted to the School of Graduate Studies to pursue a degree offered in one department may be admitted to a degree program in another department if the admission criteria of the latter department are met. Application re-evaluation of major (Form 1-B) is available at the Office of Admissions.

Non-degree Postgraduate Status

A person whose application to the graduate school has not been approved may be admitted to UAH as a non-degree postgraduate student. Those admitted in this category may register in courses at the 500 level or below at UAH, provided that all prerequisites for those courses have been met. In some instances students may, with the approval of the department chairman, take courses at the 600 level or above.

Upon completion of 12 or more semester hours of advanced-level courses with an average grade of B or better, a student may reapply for admission to the graduate school. An applicant may be admitted conditionally, if acceptance is recommended by the chairman of the appropriate academic department and approval of the Graduate Dean.

Once a student is admitted, graduate credit for courses taken during NPG status may be granted upon admission to the graduate school subject to the following conditions and limitations:

1. All grades received in 500 level courses or above during NPG status must have been B or higher.
2. Upon petition by the student, up to twelve credit hours may be granted for courses taken as an NPG and completed with grade of A or B, subject to approval by the major department and the graduate dean. These courses will not be used for calculating graduate G.P.A.

General Academic Information

A student must be admitted to the School of Graduate Studies to receive graduate credit for courses taken. A full-time graduate student is one enrolled in courses totaling six to ten semester hours a term. The maximum course load for a graduate student is 10 semester hours a term. A student employed full-time (40 or more clock hours a week) may schedule no more than 3 semester hours of graduate work a term without permission of the faculty advisor or the department chairman if the student does not have an advisor. A full-time teacher working toward certification is limited to one course a term and a maximum of three three-hour courses an academic year (nine months).

Students should schedule required undergraduate prerequisites or deficiencies early in the graduate program.

Students working on a thesis or dissertation must register for thesis or dissertation credit each term they receive supervision. Thesis and dissertation supervision courses are graded on a pass/fail basis.
## Financial Information

### UNDERGRADUATE TUITION (Fall, 1990)

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<th>HOURS</th>
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<th>REGISTRATION</th>
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</table>

For each semester hour in excess of 16 add $68.90 Per hour ($137.80 for non-resident)

ABOVE TOTAL DOES NOT INCLUDE LAB FEES AND/OR SCHEDULE ADJUSTMENT FEES.

### GRADUATE TUITION (Fall, 1990)

<table>
<thead>
<tr>
<th>HOURS</th>
<th>TUITION FEES</th>
<th>REGISTRATION</th>
<th>TOTAL REQUIRED TUITION &amp; FEES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>IN-STATE</td>
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<tr>
<td>1</td>
<td>$ 99.00</td>
<td>$26.00</td>
<td>$125.00</td>
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<tr>
<td>2</td>
<td>198.00</td>
<td>26.00</td>
<td>224.00</td>
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<td>3</td>
<td>297.00</td>
<td>26.00</td>
<td>323.00</td>
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<tr>
<td>4</td>
<td>396.00</td>
<td>26.00</td>
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<tr>
<td>8</td>
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<td>764.00</td>
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<tr>
<td>9</td>
<td>831.00</td>
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</tr>
<tr>
<td>10-13</td>
<td>895.00</td>
<td>26.00</td>
<td>921.00</td>
</tr>
</tbody>
</table>

For each semester hour in excess of 12 add $64.00 per hour ($128.00 for non-resident)

ABOVE TOTAL DOES NOT INCLUDE LAB FEES AND/OR SCHEDULE ADJUSTMENT FEES.

The University reserves the right to change its fees, charges, rules and regulations at the beginning of any term and without prior notice. Generally, the Board of Trustees of the University of Alabama System considers proposals for changes in fee structure at its May or June meeting.
An estimated average cost of books per term for full-time students is $150.00.

These fees do not apply to any short-term, off-campus, or noncredit offering. For additional information on these courses, see section on Division of Continuing Education.

BILLING AND PAYMENT PROCEDURE

Students participating in early registration will receive in the mail (see mailing date in calendar in the timetable of classes) a schedule of courses, and a tuition bill. Tuition and other charges should be paid in full by the close of business on the due date indicated on the statement. Students whose payments have not been received by the deadline may have their registration canceled, and such students will be required to complete a new set of registration materials during open registration hours.

Tuition and other charges will be payable at the time of registration for all who register during periods of open registration.

Charges resulting from dropping, adding, or other changes will be due at the time the change is made.

Many students have all or part of their tuition and other costs paid by various sponsoring agencies (including tuition assistance for faculty, staff and their dependents). It is the student’s responsibility to see that the Bursar’s Office receives the approved tuition assistance authorization from his sponsor. In many cases the sponsor does not pay the entire statement. These students should contact the Bursar’s Office to determine the unpaid amount and make full payment before the due date to avoid cancellation of their registration.

Fees for courses being audited are the same as those being taken for credit.

Full-time students may include full-term, regular credit courses offered through the Division of Continuing Education under the maximum fee structure of UAH. Standard fees and fee conditions, however, do not apply for short-term, off-campus, or noncredit offerings.

Other Charges

| Application (non-refundable) | $20.00 |
| Change of schedule (non-refundable) | |
| Drop/add/change to audit/reinstatement | $20.00 |
| Late registration (non-refundable) | $20.00 |
| Credit by examination or validation, per semester hour | $10.00 |

Laboratory and Special Fees

| Level 1 | $10.00 |
| Level 2 | $20.00 |
| Level 3 | $30.00 |
| Level 4 | $40.00 |
| Level 5 | $50.00 |
| Level 6 | $60.00 |
| Level 7 | $70.00 |
| Level 8 | $80.00 |
| Level 9 | $90.00 |
| Level 10 | $100.00 |
| Level 11 | $110.00 |
| Level 12 | $120.00 |
| Level 13 | $130.00 |
| Level 14 | $140.00 |
Replacement of I.D. card .......................................................... 10.00
Transcript ........................................................................... No Charge
Duplicate Diploma ............................................................... 7.50
Thesis binding (4 copies) ..................................................... 17.50
each additional copy ................................................................ 6.00
Vehicle registration
  regulations concerning traffic and
  parking are available at the
  Campus Safety Office .......................................................... 15.00

College of Nursing

Liability Insurance (per year) .............................................. approximately 60.00
College of Nursing Pin (graduation) ................................. 35.00 - 100.00
Annual health examinations ............................................... variable

Withdrawals and Refunds

After classes have begun, students may withdraw from one or more classes until the end of
the sixth week of classes. A student desiring to withdraw from school or a class must complete
a withdrawal request form at the Office of Student Records, Room 116, University Center. Date
of withdrawal is the date the written request is received at the Office of Student Records. Date
of withdrawal will determine the amount refunded. Only course fees, lab fees, building fees,
student activity fees, out-of-state fees and Union fees are refundable.

University Housing

For current rate information contact the Housing Office at: The University of Alabama in
Huntsville, Huntsville, Alabama 35899, (205) 895-6108.

In addition to rental charges, each occupant is charged for gas and/or electricity. Residents
desiring a telephone assume responsibility for proper installation of telephone and payment of
all bills.

Office of Financial Aid

Undergraduate Student Aid

UAH has several programs to assist students in financing their college education. Compre­
hensive, updated information on all financial aid offered through the Office of Financial Aid is
available in a booklet published annually. It includes detailed information about kinds of aid,
eligibility guidelines, application procedures, criteria for awards, disbursement methods and
regulations, and institutional policy followed in administration of aid. These booklets and
necessary forms are available in the Office of Financial Aid.

Students of academic promise who can demonstrate financial need are encouraged to apply
for assistance. Realistic financial planning is an essential part of college preparation. UAH helps
qualified students find employment, scholarships, and loans as its resources permit. In plan­
ning a program of financial assistance, consideration should be given to the advisability of
combining scholarships, loans, and part-time employment since one kind of aid alone is inade­
quate in extreme cases.

Students should make financial plans well in advance of entering the University. They are
advised to write the Office of Financial Aid requesting a copy of the financial aid booklet at the
time of application to the University. Applications for student aid should be filed at the Office of Financial Aid before the priority deadline March 1, for the following school year. No award implies automatic renewal; a new application must be submitted by this deadline each year.

American College Testing Need Assessment

UAH participates in the American College Testing (ACT) Need Assessment Program. The amount of financial aid granted a student is based upon financial need, which ACT assists colleges and universities in determining. Students are required to submit a Family Financial Statement (FFS) to ACT designating UAH (Code 0053) as a recipient of the needs analysis report. The FFS should be mailed to ACT no later than March 1. The FFS may be obtained from a secondary school or the Office of Financial Aid at UAH.

Types of Financial Aid

Scholarships

Most scholarships at UAH are awarded for the academic year (nine months) but are seldom available for the summer term. Nearly all scholarships are awarded on a merit-need basis. Most available scholarships vary from $100 to $2,500. Scholarship applications are available at the Office of Financial Aid. The deadline for receipt of applications is February 2.

The following scholarships are awarded annually:

The Kelly Zettle Memorial Scholarship was established in memory of Jacqueline Kelly Zettle from donations to the University. It is awarded each year to a student or students pursuing a music major.

The Gerhard B. Heller Memorial Scholarship was established in memory of the late Gerhard B. Heller from donations to the University from family and friends. It is awarded annually for one year beginning with the fall term to a full-time junior or senior majoring in physics or chemistry.

The Samuel Palmer Memorial Scholarship is a scholarship trust fund established in 1967 by the Board of Trustees of the University of Alabama. Interest from this fund is used for two scholarships awarded annually to UAH students. The recipients are selected on the basis of scholastic standing and leadership and must be full-time undergraduate students.

The JoAnn Sloan Memorial Scholarship was established in memory of JoAnn Elizabeth Sloan from donations to the University from family and friends. The award is given annually to full-time students majoring in nursing.

The American Institute of Industrial Engineers, Inc., Scholarship-The North Alabama chapter of AIIE provides two tuition scholarships each year for one term. A recipient is selected for fall term and another for spring term. To be eligible, the student must be a full-time undergraduate student who intends to specialize in industrial and systems engineering.

The Gregory David Johnston Scholarship was established in honor of Gregory David Johnston and awarded annually by the UAH Foundation to a senior student at Huntsville High School. This scholarship is awarded to a student who demonstrates outstanding leadership ability.

The Felix L. Newman Scholarship was established by a gift from Felix L. Newman, a longtime resident of Huntsville and devoted friend of the University. It is awarded each year to a student at the junior level or above pursuing a degree in the humanities.

The University Women's Club Scholarship is a tuition scholarship awarded annually by the University Women's Club to a full-time student at UAH with sophomore standing having a minimum of 3.0 grade-point average. The recipient must be an academically deserving student who has demonstrated leadership or a potential for leadership.

The University Undergraduate Tuition Scholarship is awarded by individual academic departments to students demonstrating outstanding scholarship. Each scholarship covers the basic tuition for three consecutive terms.
The University Alumni Scholarship - The Alumni Association provides several scholarships each year to full-time undergraduate students. The recipients are selected on the basis of need, leadership ability, and academic achievement.

The August S. Ries Scholarship is an annual scholarship awarded each year by the Huntsville chapter of the Alabama Society of Professional Engineers to a full-time freshman engineering student who has a minimum 3.0 grade-point average.

The University of Alabama Huntsville Foundation Scholarship is awarded annually to high school seniors from Madison County who plan to attend UAH. Criteria for eligibility consists of scholastic ability, leadership, and financial need. Selection of winners is made by the high schools.

The George W. Ditto Scholarship, an endowed scholarship, was established in memory of George W. Ditto, a man who devoted his life to the teaching profession. Two full-tuition, one year, non-renewable scholarships are offered annually to two science or engineering majors.

The Mildred D. Simmons Memorial Scholarship was established by a gift from William K. Simmons, Jr., of Huntsville and by other devoted friends and relatives. Mrs. Simmons was a graduate of Crawford W. Long School of Nursing and practiced in Huntsville for many years. The scholarship is awarded each year to a student in the College of Nursing.

The UAH Leadership Scholarship - The Division of Student Affairs awards several leadership scholarships yearly. These are one-year, non-renewable scholarships.

UAH Honor Scholarship Program - Full-tuition scholarships are awarded to National Merit Semifinalists and National Achievement Semifinalist who graduate from high schools in the UAH service area. The scholarships are renewable based on cumulative grade-point average.

Leroy Simms Scholarship Fund - An endowed fund established to recognize the many contributions of Mr. Leroy Simms to The University of Alabama in Huntsville. The full-tuition scholarship is awarded annually to the National Merit Semifinalists or National Achievement Semifinalists with the highest composite ACT score.

R. Wayne Sanders Memorial Scholarship - An endowed fund established by Mr. and Mrs. M.W. Sanders in memory of their son, R. Wayne Sanders. The full-tuition scholarship is awarded annually to a junior or senior pursuing a degree in the liberal arts. The recipient must exhibit outstanding leadership traits.

Thomas and Minnie Rast Scholarship Fund - An endowed fund established to recognize the many contributions and dedicated service of Mr. and Mrs. Thomas E. Rast to The University of Alabama in Huntsville. Full-tuition scholarships are awarded to junior and senior level students pursuing an undergraduate degree at UAH.

Scottsboro Rotary Club Scholarship - Full-tuition scholarships awarded annually to two Scottsboro High School seniors who have outstanding academic and extracurricular high school records.

Arab Rotary Club Scholarship - Full-tuition scholarships awarded annually to Arab High School seniors who have outstanding academic and extracurricular high school records.

Dr. Braxton Smith Scholarship - Full tuition scholarship awarded annually to Arab High School senior who has an outstanding academic record.

James D. Hayes Scholarship - An endowed fund established to recognize the many contributions and dedicated service of Mr. James D. Hayes to the University of Alabama in Huntsville. The full-tuition scholarship is awarded to a junior or senior engineering major.

William Penn Nichols Memorial Endowed Scholarship - An endowed fund established by Mrs. Josephine Nichols Holliman to honor the memory of her father, William Penn Nichols. One full-tuition scholarship is awarded annually to a deserving student with preference given to descendants of the late William Penn Nichols.

Decatur Scholarship - Full-tuition scholarships awarded annually to Decatur, Alabama seniors who have outstanding academic and extracurricular high school records.
Frances C. Roberts Endowed Scholarship—An endowed fund established by the History Department of The University of Alabama in Huntsville to honor Dr. Frances Cabaniss Roberts for her many contributions and dedicated service. A full-tuition scholarship is awarded annually with preference given to a junior or senior history major.

William R. Gillies Society of Manufacturing Engineers Scholarship—A one year scholarship established by the North Alabama Society of Manufacturing Engineers. The scholarship is awarded annually to a mechanical engineering or industrial and systems engineering major who has earned sixty credit hours or more.

Outstanding High School Senior Scholarship—Full-tuition scholarships awarded to outstanding high school seniors who graduate from high schools in the UAH service area. The scholarships are renewable on a competitive basis.

Outstanding Junior College Scholarship—Full-tuition scholarships awarded to graduating junior college students in the State.

Hal Dreifus Jewelers Scholarship—A scholarship fund established by Dreifus Jewelers for a full-time undergraduate enrolled in the College of Liberal Arts.

W.L. and Lucille Howard Memorial Scholarship—An endowed fund established by the University of Alabama Huntsville Foundation in memory of Mr. and Mrs. Howard. This fund offers several full scholarships yearly to junior or senior level students enrolled in the College of Administrative Science.

Isidore and Mamie Wind and Children Scholarship Fund—An endowed fund established by a trust in memory of the Wind family. Several full scholarships are awarded yearly to full-time UAH students.

Irene Wright Endowed Scholarship—An endowed fund established in memory of Mrs. Irene Wright by private donations and assets of the University of Alabama Huntsville Foundation. One full-tuition scholarship is available yearly to an entering freshman enrolling in the College of Liberal Arts.

Bromberg Scholarship—An endowment established by Bromberg and Company for the awarding of yearly scholarship assistance to a student majoring in fine arts.

Elizabeth M. Fisher Memorial Scholarship. An endowed scholarship fund established by the Fisher Family as a memorial endowment for Mrs. Elizabeth M. Fisher. A tuition scholarship is awarded yearly to a graduate student in the College of Nursing.

Boeing Scholarship—A scholarship fund established by the Boeing corporation for junior and senior level students enrolled in the College of Engineering.

The Carl T. Jones Engineering Scholarship—An endowed fund, established from donations to UAH and the University of Alabama Huntsville Foundation in memory of Carl T. Jones, prominent Huntsville businessman and civic leader. An award is made annually to a student majoring in civil engineering.

The Wernher von Braun Space Sciences Scholarship—An endowed scholarship, created by the National Space Club Huntsville Committee and friends in honor of Dr. von Braun. This scholarship is awarded to a senior in a space related field.

The Spencer Scholarship—An endowed fund, established to recognize the untiring service of the Spencers to the University of Alabama in Huntsville. It is awarded annually to a UAH junior or senior.

The Bell Endowed Scholarship was created by a bequest to honor the memories of Robert Kirk Bell and Carolyn Pride Bell. This endowed scholarship is awarded to an undergraduate student majoring in liberal arts.

The Charles E. Shaver, Sr. Presidential Scholarship—An endowed fund, established by the University of Alabama Huntsville Foundation to honor Mr. Shaver, former long-term chairman of the Foundation. The scholarship recognizes entering freshman of exceptional ability and is renewable for four years.
The Pruitt Memorial Scholarship - An endowed fund, established in memory of Ms. Christine Martin Pruitt, a UAH graduate. One scholarship is awarded annually to an undergraduate in the College of Nursing.

The Instrument Society of America Scholarship was created by the local chapter of the Instrument Society of America. This endowed fund provides two scholarships annually, one to a student in the College of Engineering and one to a student in the College of Administrative Science.

The NEC Electronics Scholarship is an endowed fund established by NEC Electronics, Inc. to recognize and support an outstanding student initially in the field of electrical engineering who exhibits qualities of scholarship, personal integrity, and excellence in all endeavors.

The M. Louis Salmon Scholarship - An endowed fund, created by the Watts family in honor of Mr. Salmon, third chairman of the UAH Foundation, for his outstanding service to higher education and his leadership in civic affairs.

The Humana Hospital-Huntsville Scholarship is an endowed fund established by Mr. and Mrs. William T. Dale. The scholarship is awarded annually to a student who participates in the UAH Wind Ensemble.

The 3M Scholarships are funded by 3M Company on behalf of its facilities in Alabama. Three awards are made each year to students in the College of Engineering.

The Yvonne M. Kheir Memorial Scholarship - An endowed fund, was created by members of the Kheir family in honor of their mother. This award is presented to a student majoring in electrical and computer engineering.

The Gary Lindsay Memorial Scholarship is an endowed fund created by friends and co-workers at Teledyne Brown Engineering to honor Mr. Lindsay. This award is presented annually to a student in engineering.

The Margaret Bond Economics Scholarship is an endowed fund established in honor of Dr. Bond, former chairperson of the Department of Economics and Finance. The recipient, a junior or senior majoring in economics, is selected by the faculty of the College of Administrative Science.

Public Relations Council of Alabama Scholarship - The Huntsville Chapter of the Public Relations Council of Alabama provides a scholarship to an undergraduate student seeking a degree in an accredited public relations related area of study. Junior standing with at least a 3.0 GPA is required.

The Jo and Henry Dark Scholarship - An endowed fund established in honor of Mr. and Mrs. Dark to assist needy students in the College of Administrative Science. This full-tuition award is presented annually.

The Dr. J.E. Whitaker Scholarship - An endowed fund established in memory of Dr. J.E. Whitaker, a prominent Huntsville physician for many years. Full-tuition awards are presented annually to needy students.

State Nursing Scholarships

An act was passed by the Alabama legislature in 1957 to provide scholarships for basic nursing education. These scholarships are each $600 to be awarded to applicants from the state-at-large. Applicants must be Alabama residents and accepted for admission by the UAH College of Nursing. Continuation of the scholarship for three years after the first year is subject to annual review and contingent upon the student’s progress and aptitude. A scholarship student must agree to practice professional nursing in Alabama for at least one year immediately after graduation from the UAH College of Nursing. If the recipient is unable to fulfill the obligation, it may be satisfied by repaying the amount of the scholarship received to the UAH Scholarship Fund.
Loans

Although it is sometimes necessary to borrow money to finance an education, caution is advised. Generally a student should not rely primarily on loans and is advised not to borrow more than half of what is needed to meet expenses.

The Perkins Loan Program is available to all students enrolled at least half-time and who have exceptional financial need as indicated by the Family Financial Statement. An undergraduate may be eligible to borrow a maximum of $9,000 over several years. Graduate or professional students may be eligible to borrow a maximum of $18,000, including their undergraduate loans. The program contains a provision that part of the loan plus interest may be canceled if the borrower performs military service in hostile areas. Forgiveness is also provided for teachers of handicapped or disadvantaged students and for those teaching in other special programs designated by the U.S. Office of Education.

The Stafford Loan Program provides federal backing for loans made through private lending agencies such as banks, savings and loans, and credit unions.

A maximum of $2,625 per academic year may be applied for in most states for freshmen and sophomores, $4,000 for juniors and $7,500 for students enrolled in graduate school if the educational costs warrant borrowing this much money. Total loans outstanding may not exceed $17,250 for undergraduates. The aggregate maximum may be extended to $54,750 for students who borrow for graduate study.

Loans and Scholarships for Medical Students

Information about financial assistance for medical students is available from the Office of Medical Student Affairs, Clinical Science Center.

Emergency Loans

Emergency Student Loan Fund—Any full-time student of UAH officially enrolled and physically present on campus is eligible to apply for an emergency loan. These loans are made for emergencies only. The maximum amount of the loan is $200, but normally loans will be made for $100 or less for a maximum of ninety days or until the end of the term, whichever comes first. Applications are available from the Office of Financial Aid.

Grants

A Supplemental Educational Opportunity Grant—provides aid to undergraduate students who would not, except for the grant, be financially able to attend college. A student must be accepted for enrollment, show evidence of academic promise, and be capable of maintaining good standing in his/her course of study. Grants may be renewed for the four years of undergraduate study, subject to the availability of funds, unless a major change in the family’s financial condition causes the student to be ineligible. Grants are awarded in compliance with eligibility based on federal guidelines.

The Pell Grant Program—assists eligible students by providing help in meeting the cost of postsecondary education. To be eligible, a student must meet the following criteria: (1) establish financial need by means of the Pell application; (2) be enrolled in an eligible program; (3) be a U.S. citizen or in the U.S. for other than a temporary purpose and intend to become a permanent resident or be a permanent resident of the Trust Territories of the Pacific Islands.

The Pell application is submitted to a processing agency which calculates the student’s aid index. The institution then uses this SAI report to calculate the Pell Grant award based on full or part-time enrollment and the cost to attend the institution. All eligible students are awarded grants.

The Alabama Student Assistance Program—is a state-federal aid program designed to provide Alabama residents financial assistance for undergraduate postsecondary education. Grants
are awarded for one year. The grants are renewable, but new applications must be made each year. All awards are determined by student eligibility requirements, available funds, and student need. Students should contact the Office of Financial Aid for information regarding eligibility, application, selection, and awards procedures.

Federal Financial Aid Repayment

Federally funded student financial aid (Pell, SEOG, Perkins, Stafford, SLS) to a student who withdraws after registration but before the tenth day of an academic term will be repaid to the respective program source. When withdrawal or reduction of class load occurs after the tenth day of the term, full tuition charges will be paid from the aid source. The unused portion of the aid will be repaid to the respective aid source. Specific regulations governing this policy may be found in Student Financial Aid, a brochure available in the Office of Financial Aid.

Work-Study Program

The College Work-Study Program provides employment for students who need financial assistance. A student works part-time while attending the University and during vacation periods. Students engaged in this program work on campus. In determining eligibility, preference will be given to students with the greatest financial need.

Tuition Assistance

Some businesses and industries provide tuition assistance to employees attending UAH. An employed student should consult the personnel office of his place of employment to determine its policy regarding tuition assistance.

Vocational Rehabilitation

Students with a physical disability may obtain grants-in-aid covering fees, books, and supplies through the Vocational Rehabilitation Service, which is supported by federal and state appropriations. For further information, write to: Alabama Vocational Rehabilitation Service, 407 Governors Drive, S.W., Huntsville, Alabama 35801 or the Director of Vocational Rehabilitation, Room 416, State Office Building, Montgomery, Alabama 36104.

Graduate

Financial Aid is available in the form of teaching and research assistantships, tuition scholarships, work-study programs and loans, and Co-op programs. Interested students should consult their advisors and department chairmen for other types of aid.

Graduate Assistantships

Graduate assistantships are offered to encourage graduate work and to promote research. Graduate assistants have as their primary goal a graduate degree, and the assistantships are part of their graduate education. Such appointments are available through various departments of instruction and under the auspices of the School of Graduate Studies. Any student qualified for admission to the School of Graduate Studies is eligible to apply for a graduate assistantship.

A student eligible for an assistantship may be appointed as a Graduate Teaching Assistant (TA) or Graduate Research Assistant (RA). Assistantships usually require half-time (twenty hours per week) service to the University but may be appointed more or less than half-time in exceptional cases. The graduate assistant may not hold other employment during any term in which this assistantship is in effect. The graduate assistant is registered for a minimum of six semester hours and not more than nine during any term in which an appointment is held. Two kinds of assistantships are available:
1. Graduate Teaching Assistantships

As the title implies, graduate teaching assistants (TA's) share the faculty's responsibility for teaching. The purpose of this assistantship is twofold: one is to support departmental teaching program, and another is to aid the student's professional development. The teaching assistant is not intended to be a grader only; however, grading papers may be a part of the assigned duties of the assistant.

The TA's fractional teaching load will necessarily vary from one department to another, and the load should be proportional to the normal full-time teaching load carried by other staff members in the department.

2. Graduate Research Assistantships

A graduate research assistant (RA) does research under the supervision of a faculty member. At times, a research project to which the research assistant is appointed may eventually lead to a thesis or dissertation topic; however, a research supervisor cannot guarantee that a particular project will provide suitable material for a thesis. All assistantship appointments are subject to the continuing availability of funds. Appointments are made only when resources to support them are assured, but a financial emergency in the University could cause positions, including those of graduate assistants, to be terminated prior to the end of the appointment period. Assistantship support normally will not continue past the graduation of the assistant.

Veterans Affairs

UAH offers a full range of services to the student attending under the Veterans Administration Educational Assistance Program. These services include veterans' advisement, educational loans, and the Veteran Tutorial Program.

Under the current Veterans Educational Assistance Programs, which affect most veterans, the veteran receives an allowance directly from the government. The veteran is responsible for paying fees directly to the University and meeting payment deadlines applicable for all students.

The Veterans Administration will make full payment only when the student carries a full academic load. To facilitate the prompt and accurate reporting of the student's status and course load, the veteran must complete a brief form every term enrolled. This form must be turned in to the veterans affairs clerk in the Office of Financial Aid, Room 124, University Center.

It is the student's responsibility to remain in good standing with the Veterans Administration and to respond to notification of changes in regulations. For additional information, write to: Veterans Administration Regional Office, 474 South Court Street, Montgomery, Alabama 36104.

Many students who are children of veterans of World War I, World War II, or the Korean War may be eligible for benefits under the War Orphans Educational Assistance Act (PL 634). Write the nearest Veterans Administration Regional Office for additional information.

The Alabama G.I. and Dependents Education Benefits Act grants tuition assistance to eligible veterans, their children, widows and wives. Tuition is paid directly to the school. For additional information, write to: Assistant to the Director, Department of Veteran's Affairs, P.O. Box 1509, Montgomery, Alabama 36102.

Tuition and Fees

Tuition and fees are paid for a graduate assistant who holds one-half time (20 hours per week) appointment and is registered for six to nine semester hours. An assistant who holds one-quarter time (10 hours per week) appointment is eligible for one-half tuition support only for a full course load.
Departments should submit to the graduate office the Tuition Support Request (Form 23) for the appointees before the close of the early registration period for entry into the Student Accounts System. Upon its receipt and approval, the form will be forwarded to the Office of Financial Aids.

Tuition Scholarships

Full tuition scholarships may be awarded to qualified students without assistantship appointments. Tuition grants are limited to a maximum of two per department at any given time.

1. Eligibility
   A department may award a full tuition grant to a qualified student.
   Recipient must:
   a. be a full-time student;
   b. be a U.S. citizen;
   c. have unconditional admission status.

2. Appointment Procedure
   a. The departmental faculty chooses the awardees from qualified applicants
   b. An appointment letter (similar to the assistantship letter without duties) is written to each awardee and approved by the chairman. The letter is then forwarded to the graduate dean’s office along with a copy of the Summary Information sheet (Form 1A) for final approval.

3. Tuition Request
   Departments submit to the graduate office tuition requests for the awardees on the Tuition Support Request (Form 23), along with those of the graduate assistants, by the close of the early registration period.

Nurse Traineeship Program

This program was established by the Nurse Training Act of 1975 and provides grant assistance to currently licensed professional nurses who wish to enroll full-time in a graduate nursing program. Several full tuition grants are awarded yearly. Contact the College of Nursing.

Cooperative Education (Co-op) Program

The UAH Graduate Cooperative Education (Co-op) Program offers qualified candidates the opportunity to combine classroom experience with closely-related practical work experience in private industry or government. Students accepted for Graduate Co-op normally work six months, return as a full-time student for six months, and then return to work for the next six months. In addition, students are encouraged to take one degree-related course during each work term. Frequently, students can fulfill some University research requirements in conjunction with work they are completing with their employer. Salary during work terms is based on the student’s qualifications and is comparable to the pay of a typical employee who has similar education and experience.

Students will be considered as candidates for Graduate Co-op positions when the following requirements are met:

1. Admissions to the School of Graduate Studies as a degree candidate.
2. A minimum of a 3.0 grade point average of all graduate course work. If the student’s field of study is significantly different from his/her undergraduate major, the student may need to complete nine hours of graduate work at UAH.
3. Formal application to the UAH Co-op Office. The mailing address is Cooperative Education Office, Room 212, University Center, The University of Alabama in Huntsville, Huntsville, AL 35899. The telephone number is (205) 895-6741.
Graduate Record Examination Fee Waiver Program

UAH is a cooperative institute for the Graduate Record Examination (GRE) Fee Waiver Program. These waivers are limited to senior students receiving financial assistance through the University whose parents' financial contribution is estimated to be zero for the applicant's senior year in college.

Information and fee waiver certificates may be obtained in the Office of Financial Aid.
Academic Advisement and Information Center

Academic advising is available to students in the Academic Advisement and Information Center, in advising offices in the Colleges of Nursing, Engineering, and Administrative Science and in the department or program in which a major has been declared. Special advising is provided in the professional areas of law and medicine; and career counseling is available through the Office of Career Planning and Placement. Freshmen and undeclared majors are advised in the Academic Advisement Center or, in the case of engineering and nursing freshmen, in the advising offices of the Colleges of Engineering and Nursing. When students declare a major (program of study), they are assigned a faculty advisor in their major department or program. All students are encouraged to maintain contact with their advisors and to take advantage of the opportunities for academic advising which the University provides.

Located in Room 118 University Center, the Academic Advisement and Information Center is staffed by a team of experienced faculty. They assist prospective and enrolled students in course and program planning, disseminate accurate information about academic programs and procedures, make referrals to appropriate offices and services, and advise and register students during registrations and orientations. Appointments may be made by calling 895-6290.

All freshmen students except those enrolled in the Colleges of Engineering and Nursing are required to visit the Advisement Center at least once each term to review their academic progress and to plan their schedule of courses for the next term. These schedules must be signed by an advisor in the AAIC in order to be processed by the Office of Records. Undergraduates enrolled as special students must also have schedules validated each term in the Academic Advisement Center as long as they remain in the special-student category. Sophomore students outside of the three professional colleges (Administrative Science, Engineering and Nursing) who have not declared a major will be advised in the Advisement Center and will continue to have their registration cards signed by advisors in the AAIC.

Prospective transfer students who wish to gain information concerning the general requirements of various undergraduate degree programs may seek the services of the Academic Advisement Center. These students are further referred to department chairmen who can aid them in program planning in their major fields of interest. Transfer students will be advised and registered by the appropriate faculty advisor. Once enrolled at the University, transfer students beyond the freshmen level who are not enrolled in the Colleges of Engineering, Nursing, and Administrative Science, are advised by the Academic Advisement Center for the first term.

Academic rules and regulations stated in this catalog are subject to review for extenuating circumstances. Students are encouraged to use the services of the Academic Advisement and Information Center for the appropriate procedure of appeal. Academic appeals originate with the student and will be processed through the student’s major department, the dean of the college and the Office of the Provost and Vice President for Academic Affairs, in that order.

Students beyond the freshman level who have not filed a Program of Study and are enrolled in the College of Administrative Science must have schedule cards approved each semester by a faculty adviser in that school. For an appointment, call 895-6024.
Policies

Nondiscrimination

The University of Alabama in Huntsville is committed to equal employment and educational opportunity. Its policy is one of nondiscrimination with regard to any person on the basis of race, color, national origin, religion, sex, or age, and with regard to any otherwise qualified handicapped individual solely on the basis of handicap. This equal opportunity policy extends to the recruitment and admission of students, the recruitment and employment of faculty and staff, and the operation of all programs and activities. Additionally, the University is an affirmative action employer of protected minorities and women.

The foregoing commitment is designated to meet the nondiscrimination affirmative action requirements of applicable federal law, including the following statutes (with implementing regulations) and executive orders, as amended: Title VI and Title VII, Civil Rights Act of 1964; Executive Order 11246; the Age Discrimination in Employment Act of 1967 and the Age Discrimination Act of 1975; Title IX, Education Amendments of 1972; the Equal Pay Act of 1963; the Rehabilitation Act of 1972; and the Vietnam Era Veteran Readjustment Assistance Act of 1974.

Inquiries or complaints concerning the application to these federal requirements and this policy should be directed to one of the following persons:

Dr. Carolyn White
Faculty EEO Officer
123 Madison Hall
The University of Alabama in Huntsville
Huntsville, AL 35899 (205-895-6337)

Ms. Gerry Moore
Staff EEO Coordinator
135 Madison Hall
The University of Alabama in Huntsville
Huntsville, AL 35899 (205-895-6545)

Marital, Parental, or Temporary Disability Status

The University does not discriminate against any student or exclude any student from its educational program or extracurricular activity on the basis of a student's sex, marital, or parental status. Pregnancy or related conditions are treated the same as other temporary disabilities. The University may require written approval of a student's physician regarding participation in an activity or educational program which might adversely affect the safety or health of a student with a temporary disability.

Confidentiality of Records

The Family Educational Rights and Privacy Act of 1974 is a federal law which protects the confidentiality of student educational records. To implement this law UAH has formulated and adopted a written institutional policy governing the handling of these records. Copies of this policy document are available to students at the Office of Admissions and Records, and it should be referred to for a more comprehensive treatment of this subject than is given in the summary statement here.

Under this law and university policy, a student has a right of access to his educational records and may inspect and review the information contained in them. The term educational record generally refers to any record maintained by the institution directly pertaining to an individual as a student, other than that made by institutional, supervisory, or administrative personnel remaining in the sole possession of the maker; by campus security; or by a physician, psychiatrist, or any other such professional medical personnel. This right of access does not extend to
financial information submitted by the student’s parents or to confidential letters and recommendations collected under established policies of confidentiality and placed in his files before January 1, 1975. Furthermore, the student may at his discretion waive the right to any confidential letters of recommendation.

If a student believes his records contain inaccurate, misleading, or otherwise inappropriate data, he may bring the matter to the attention of the records official concerned. If by informal discussion with this official the student does not obtain the corrective action desired, he is entitled to a hearing at which he may challenge the item he finds objectionable. The decision of the hearing official or panel shall be final. If the decision is adverse to the student, he may insert in his educational record an explanatory statement relating to the contested item. A student’s privacy interest in his records is further protected by the rule against unauthorized disclosure. The University may not without the student’s consent release his educational records or any personally identifiable information contained in them to other individuals or agencies. Disclosure to the following parties, however, is specifically excepted by the Privacy Act from this rule: (a) administrative and academic personnel within the institution who have a legitimate educational interest; (b) officials of institutions in which the student seeks to enroll; (c) persons or organizations to whom the student is applying for financial aid; (d) accrediting agencies; (e) organizations conducting studies relating to tests, student aid programs, instruction; (f) certain federal and state government officials; (g) any person where the disclosure is required for compliance with a judicial order to proper subpoena; (h) appropriate persons where a health or safety emergency affecting the student exists; and (i) parents of a dependent student. As to some of these parties, additional conditions must be met in order for the disclosure to be allowable in the absence of a written consent from the student. Personally identifiable information will be transmitted by the University to a third party only on the condition that the recipient not permit any other party to have access to it without the student’s consent.

The University may release directory information to others without the necessity of obtaining permission from the student. Directory information is limited to the student’s name, address (local and permanent), telephone number, date and place of birth, major field of study, participation in officially recognized activities and sports, weight and height statistics if he is an athletic team member, date of attendance, degrees and awards received, and the previous educational institution most recently attended. If the student does not wish this information to be released, he may so indicate on the form provided at the time of registration, and the University will withhold it during that particular term. This request for nondisclosure of directory information must be renewed each term.

The following officials have been designated as records officials for student records within their respective area:

Associate Vice President for Academic Affairs
Assistant Vice President for Enrollment Management (Admissions and Records)
Director, Academic Advisement and Information Center
Director, Cooperative Education
Assistant Dean, College of Administrative Science
Assistant to Dean, Engineering, Lower Division
Appropriate Engineering Department Chairman, Upper Division and Graduate
Director, Nursing, Undergraduate Program
Director, Nursing, Graduate Program
Director, Nursing, RN Education
Director, Continuing Education
Vice-President, Student Affairs
Director, Medical Student Affairs
Director, Financial Aid
Director, Student Development Services
A student should make a request concerning his educational records to the appropriate official listed above. Any student who believes that his rights under the Privacy Act have been violated by the University may notify and request assistance from the Provost and Vice President for Academic Affairs and may file a complaint with the Family Educational Rights and Privacy Act Office, Department of Health, Education, and Welfare, Washington, D.C. 20201.

Academic Responsibility

Students at the University of Alabama in Huntsville have the following academic responsibilities:

1. To consult their advisors on all matters pertaining to their academic careers, including changes in their programs.
2. To observe all regulations of their college and select courses according to the requirements of that college.
3. To attend all meetings of each class in which they are enrolled. Instructors will announce at the beginning of the term if they consider attendance in computing final grades.
4. To fulfill all requirements for graduation.
5. To be personally responsible for fulfilling all requirements and observing all regulations at UAH.
6. To answer promptly all written notices from advisors, faculty, deans and other University officers.
7. To file an “Application for Degree” in the Office of Student Records two terms before the expected date of graduation.
8. To enroll in only those courses for which the stated prerequisite(s) (if there are any) have been satisfactorily completed. Failure to comply with this procedure may result in administrative withdrawal.
9. To maintain the integrity of the classroom by practicing academic honesty. Students should refer to the Student handbook for details regarding academic dishonesty.

Plagiarism

Plagiarism is the use of another's work as if it were one's own. A graduate student found guilty through University processes of plagiarism or falsification of data or results in any program is subject to dismissal from the University.

Testing Service

The tests used for admissions, credit by examination, and placement which are administered through this office include: the American College Testing (ACT), the Miller Analogies Test (MAT), the Graduate Record Examination (GRE), the Medical College Admissions Test (MCAT), the College Level Examination Program (CLEP), the General Education Development (GED) Testing Program, the English Language Proficiency Test (ELPT), the Mathematics Placement Test, the UAH chemistry placement test, and the National League for Nursing (NLN) profile examinations. Applications and information pertaining to the following testing programs are also available: the Graduate Management Admissions Test (GMAT), the National Teachers Examination (NTE), the Law School Admission Test (LSAT), the Test of English as a Foreign Language (TOEFL), and the Alabama Initial Teacher Certification Test.

Testing Services is located in Room 203, University Center, phone, 895-6725.

Placement Tests

All students who are beginning college-level course work in English, mathematics, chemistry, or a foreign language (if taken in high school) are placed at the level best suited to their academic preparation and background.
A student’s ACT scores and high school grades determine his placement in English. In mathematics a placement test is also required.

A student desiring to register for Chemistry 121 must (1) be placed in CH 121 from results of the Chemistry Placement exam, or (2) have taken CH 101 or its equivalent.

A student who has had formal training in French, German, or Spanish is placed on the level of that language according to the number of units and grades earned in high school. A student who takes a language other than the one in which he has had formal training will begin on level 101.

A student is required to pursue placement procedures only with regard to the aforementioned academic area and conditions. If a student has not received placement recommendations before enrollment, he should contact the Office of Admissions.

The Chemistry Placement Test and residual ACT Placement tests are scheduled once each term. The Mathematics Placement Tests are scheduled regularly. Students wishing to take these tests should register in the Office of Testing Services (895-6725) at least three days before the tests are to be given. Students will be notified at the time of the exams when they can expect to receive the results of the tests. There is a charge for the residual ACT. The chemistry placement examination and Mathematics Placement Tests are free.

Credit by Examination

At UAH a student may obtain up to one-fourth of his degree (32 semester hours) by examination. There are three alternatives by which a student may gain credit through examination at UAH: 1) the Advanced Placement (AP) Program, 2) the College Level Examination Program (CLEP), and 3) departmental examinations. Credit by examination is not allowed: 1) to receive credit when a student has successfully completed a course at a higher level than the one being challenged, 2) to raise a passing grade, 3) to remove failures received in a course during the period of current enrollment, or 4) to satisfy the residence requirements for graduation.

1) Advanced Placement Program

Several UAH departments will award credit to students who have earned designated scores on Advanced Placement (AP) Program examinations of the College Entrance Examination Board. The areas in which credit is presently awarded are biological sciences, chemistry, mathematics, English composition and literature, computer science, history, physics and some foreign languages. Credit, if awarded, will be recorded without grades or quality points and will not, therefore, be included in calculation of the grade-point average.

2) College Level Examination Program (CLEP)

The College Level Examination Program (CLEP) is a national program under which a person can receive credit for college level achievement. Anyone who has practical knowledge in an area through independent study, work experience, cultural exposure, and intensive reading, may substantially reduce the cost in both time and money spent on a college degree by taking one or more of these tests. The policy for CLEP credit varies with each institution. The policies listed herein are those of UAH. These tests are given monthly but must be registered for three weeks or longer before the testing date. For a complete listing of dates and deadlines, contact the Office of Testing Services in Room 203 University Center.

CLEP General Examinations

The General Examinations are objective tests that measure achievement in five basic areas of the liberal arts: English composition, humanities, mathematics, natural sciences, and social sciences and history. Credit by General Examination can be given only if examinations were taken before entering college or during first term in college, providing the student has not been enrolled in a comparable course for more than three weeks. The student may be awarded six hours elective credit per examination. To achieve credit for any of the general tests, the student
must score a minimum of 549. No credit is awarded for scores below 549. Credit is recorded without grades or quality points and is counted as elective credit only.

**CLEP Subject Examinations**

Credit awarded for CLEP subject examinations will be recorded on the student's record without grades or quality points and will not, therefore, be included in calculation of the quality-point average. The CLEP subject tests and minimum score for credit which will be accepted as substitutes for UAH courses are listed below: (See Foreign Language section for additional information on CLEP.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Minimum Score</th>
<th>For</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Government (with essay)</td>
<td></td>
<td>PSC 101</td>
</tr>
<tr>
<td>American History I (with essay)</td>
<td>54</td>
<td>HY 221</td>
</tr>
<tr>
<td>American History II (with essay)</td>
<td>53</td>
<td>HY 222</td>
</tr>
<tr>
<td>*Analysis and Interpretation of Literature (with essay) and College Composition (composite score)</td>
<td>60</td>
<td>EH 101, 102</td>
</tr>
<tr>
<td>College French</td>
<td>37</td>
<td>FH 101</td>
</tr>
<tr>
<td>College German</td>
<td>42</td>
<td>GN 101</td>
</tr>
<tr>
<td>College German</td>
<td>40</td>
<td>GN 101, 102</td>
</tr>
<tr>
<td>College Spanish</td>
<td>37</td>
<td>SH 101</td>
</tr>
<tr>
<td>College Spanish</td>
<td>41</td>
<td>SH 101, 102</td>
</tr>
<tr>
<td>General Chemistry (take placement exam first)</td>
<td>48</td>
<td>CH 121, 123, 125, 126</td>
</tr>
<tr>
<td>Introductory Accounting</td>
<td>57</td>
<td>ACC 211, 212</td>
</tr>
<tr>
<td>Introductory Macroeconomics</td>
<td>55</td>
<td>ECN 142</td>
</tr>
<tr>
<td>Introductory Microeconomics</td>
<td>55</td>
<td>ECN 143</td>
</tr>
<tr>
<td>Introductory Sociology</td>
<td>55</td>
<td>SOC 100</td>
</tr>
<tr>
<td>Western Civilization I (with essay)</td>
<td>54</td>
<td>HY 101</td>
</tr>
<tr>
<td>Western Civilization II (with essay)</td>
<td>56</td>
<td>HY 102</td>
</tr>
</tbody>
</table>

*The English Department requires a composite score of 60 on the two examinations, Analysis and Interpretation of Literature (with essay) and the College Compositions, in order to re-
receive six hours credit for English 101, 102. Note that no credit is allowed unless both examinations are taken.

If a student does not pass the test(s) no record is placed on his transcript. General examination or subject examinations may be retaken six months after initial testing.

Credit by subject examination is not allowed unless the appropriate academic department has accepted the CLEP test for use by the University.

3) Credit by Department Examination

Departmental Examinations may be given by a department upon application by the student and with the approval of the department chair. Students may apply for such a test if they have taken college-level work in secondary school, in class or on a tutorial basis, or through private study. Satisfactory completion of the examination will normally allow the student to be eligible for credit in the appropriate course.

The amount of credit allowable through departmental examinations is determined by the appropriate academic dean and the department chair concerned.

Departments offering credit by examination on tests constructed by the department:

- Biological Sciences: Contact Department Chair
- Computer Science: All 100 and 200 level courses
- Foreign Languages: Contact Department Chair
- Mathematics: MA 003
- Music: Mu 101, 102, 103, 104, 110, 301, 302, 303, 304, 305, 306, 311, 312
- Nursing: Contact Nursing Advisement Office
- Philosophy: PHL 201, 320

For further information concerning CLEP, the AP program or Department Examinations contact the Office of Testing Services, Room 203, University Center, telephone 895-6725.

Student Classification

An undergraduate student is classified as indicated in the following table when he has completed the number of semester hours shown.

<table>
<thead>
<tr>
<th>Semester Hours Earned</th>
<th>Freshman</th>
<th>Sophomore</th>
<th>Junior</th>
<th>Senior</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-29</td>
<td>30-59</td>
<td>60-91</td>
<td>92 up</td>
</tr>
</tbody>
</table>

Student Course Loads

A full-time undergraduate student is one who is enrolled in courses totaling at least 8 semester hours a term. The maximum number of semester hours in which a student will be permitted to enroll in one term is 13, including simultaneous correspondence courses. Under exceptional circumstances, permission may be granted by the dean of the school in which the student is enrolled to take additional hours. (Equivalents will be used for noncredit and audit courses.) A student enrolling for a minimum load each term should not expect to graduate in four years unless he enrolls four terms each year.

Students are responsible for independent study. Careful budgeting of time is necessary if the desired academic goals are to be reached. Accordingly, full-time students are advised to limit their employment. Experience has shown that approximately twenty hours a week constitutes an average work load that will allow needed time for adequate study.

Students who for financial reasons need to be employed to a great extent should reduce their course load. To allow sufficient time for the amount and quality of work necessary to meet
academic goals, fully-employed undergraduate students normally find that they should take no more than two courses.

A part-time undergraduate student is one who is enrolled in courses totaling one to seven semester hours.

A full-time graduate student is one who is enrolled in courses totaling six to 10 graduate-level semester hours a term.

Orientation
A new student orientation program is held before the beginning of each term or during the first week of classes. Students accepted for admission will be invited to attend.

Registration
Dates of early and regular registration are listed in the UAH calendar. Any continuing or returning student eligible to register may take part in early registration. All past financial obligations to the University must be cleared before a student may register for courses.

A student who schedules courses during any registration period (early or regular) will have made a financial commitment to the University. If courses are dropped or changed, the student must submit these changes in writing to the Office of Student Records. Adjustments in fees, if any, will be made by the Bursar’s Office.

Schedule Adjustments
After a student has completed registration, all changes in his schedule must be made on a change-of-course form and recorded in the Office of Student Records. Advisor signature may be required.

Credit to Audit
A student is permitted to change a course from credit to audit only during the first two weeks of classes.

Removal of Course from Schedule
1. In the case of a cancelled class, submission of a change-of-course form by the student helps to correct his record.
2. In the case of a drop before class begins, a change-of-course form must be submitted before the first day of the term.
3. Except in the case of (1) or (2), removal of a course after the first scheduled meeting of a class is considered a withdrawal (see below).

Other Kinds of Changes
The following kinds of changes may be accomplished only during the designated hours of regular registration and the schedule adjustment period.
1. Change from one course to another.
2. Change from one section to another section of the same course.
3. Addition of course to schedule.
4. Change from audit to credit. Only students who are otherwise eligible to take the work for credit will be permitted to make this kind of change.

Withdrawal Policy
To withdraw from one or more classes, a student must initiate a formal request for withdrawal through the Office of Student Records. Class non-attendance does not constitute with-
drawal nor does notification to the instructor. Unless the withdrawal procedure is followed, a student continues to be enrolled in class and a failing grade may be assigned.

Regardless of the reasons for withdrawing, students must carry out withdrawal procedures as follows:

1. Obtain a Request for Withdrawal Form from the Office of Student Records, 116 University Center.

2. If withdrawing during the first two weeks of the term, submit the completed withdrawal form to the Office of Student Records. A grade of W will be recorded.

3. If withdrawing during the third through sixth week of the term, the withdrawal form must be signed by the student’s academic advisor. (Depending on the student’s class rank and program of study, the appropriate advisor is located in the Academic Advisement Center, the advising offices of the Colleges of Administrative Science, Engineering, or Nursing, or within the major department.) A grade of W or WF will be assigned by each instructor based on the student’s performance up to the date of withdrawal. A grade of WF is calculated in the same manner as an F.

4. Beginning with the seventh week of the term, a student may withdraw ONLY in exceptional circumstances and with the approval of the dean of the college in which the student is enrolled. If the dean signs the withdrawal form, a grade of W or WF will be assigned by the instructor based on the student’s performance to the date of withdrawal.

5. THE EFFECTIVE DATE OF WITHDRAWAL is the date the Request for Withdrawal Form with appropriate signatures is received in the Office of Student Records, which will then notify instructors that the student has withdrawn.

6. Students in the Cooperative Education (Co-op) program must secure the approval of the Director of Cooperative Education prior to withdrawal.

7. Veterans must secure the approval of the Veterans Advisor in the Office of Financial Aid, Room 124, University Center.

Repeating a Course

An undergraduate student may not repeat a course in which the grade of C, P or better is received with the exception of courses designated that may be repeated for credit. Concurrent registration for multiple sections of a course is disallowed.

Each time a course is taken, the hours attempted and the quality points earned will be counted in calculating the student’s grade point average. The credit for any course repeated may be counted only once towards graduation except for courses otherwise designated.

There is no limit on the number of times a graduate student may repeat a course. However, some colleges may have restrictions overriding this graduate policy.

Class Attendance

Education at UAH depends upon the cooperation of students and faculty. Students are held responsible for the full work of the course in which they are registered, including participation in the discussion and work of the class at each class meeting.

A student’s final grade in each course is determined on the basis of identified course requirements; therefore, regular class attendance is important.

Examinations

During each term, one or more announced examinations of class period length may be held. At the end of each term, a final examination period is scheduled for each course. Absences from a scheduled final examination without previous arrangement with the course instructor (except in extenuating circumstances) will be classified unexcused and a failing grade in the course will be assigned.
Any student whose final examination schedule is such that he is scheduled to take three examinations during a single day shall have the right to have the middle examination rescheduled. The date and time of the rescheduled examination shall be by mutual agreement between the student and the affected faculty member and must be agreed upon by the end of the ninth week of classes. It is the student’s responsibility to notify his instructor of this type of conflict, and it is the instructor’s responsibility to verify that the conflict actually exists. If a student is scheduled to take four examinations during a single day, then the same procedure shall apply except that the student shall now have the right to have both the second and third examinations rescheduled.

Grading System
The University of Alabama in Huntsville’s grading system includes grades of A, B, C, D, F, I, X, W, WF, S, U, P,

- A
  Superior achievement. Four quality points given per semester hour.
- B
  Above average achievement. Three quality points given per semester hour.
- C
  Average achievement. Two quality points given per semester hour.
- D
  Passing work. One quality point given per semester hour.
- F
  Failing work. No credit given; no quality points assigned.
- I
  Incomplete.
  Assigned by the instructor when a student, due to circumstances beyond his control, has not satisfied some requirement of the course. The deadline for a student to remedy a grade of I is the last day of class of the next term enrolled or one calendar year from the date of the grade whichever occurs first. If the grade of I is on a student’s record at the time of graduation, it is treated as an F.
- X
  Excused absence from examination.
  Assigned by the instructor when a student completes all course requirements except the final examination. This grade becomes an F unless the examination is completed by the time of the announced deferred examination date at the beginning of the term of next regular enrollment of the student. (See Examinations and UAH calendar.) Time schedule permits a student to take only one examination on this date. If a student receives more than one grade of X, he should make arrangements directly with other instructors for additional make-up examinations.
- W
  Withdrawal.
  Recorded by the Office of Student Records when a student withdraws from a course with passing work. (See Withdrawal.)
- WF
  Withdraw failing.
  Recorded by the Office of Student Records when a student withdraws from a course with failing work. (See Withdrawal.)
- S
  Satisfactory work. Applicable to noncredit courses and to some specified credit courses, and will not be counted in the GPA.
- U
  Unsatisfactory work. Applicable to noncredit courses and to some specified credit courses. It will be counted as an F and computed in the GPA for undergraduates, but not graduate students.
- P
  Passing work. Assigned in some courses. See Pass-Fail System.

Change of Grade
A student is permitted a maximum of one term from the date a grade is assigned to request a change of course grade. Grades submitted to the Office of Student Records can be changed only by submission by the instructor of a Change of Grade form containing a written explana-
tion of the error. The Change of Grade form must be approved by the department chair and the dean of the College concerned and received in the Office of Student Records no later than two terms from the date the original grade was assigned.

Student Grade Report
At the completion of each term, a report of final grades is mailed to the address furnished by the student.

Grade-Point Average
The grade-point average (GPA) is computed by dividing the total number of quality points earned by the total number of semester hours attempted. Courses in which a grade of W, P, or S is assigned are not included.

Academic Achievement

Honor Scholar
An undergraduate student in good standing earning 8 or more semester hours in a term with a GPA of 3.50-4.00 is distinguished by being identified as an honor scholar. A GPA of 4.00 is noted with an asterisk "+".

A student who takes less than 8 semester hours a term and establishes a GPA of 3.50-4.00 at the end of the term in which a cumulative total of at least 8 semester hours are completed will be designated as an honor scholar. For this purpose, a part-time student's work will be considered in blocks that do not overlap.

Scholar
An undergraduate student in good standing earning 8 or more semester hours in a term with a GPA of 3.00-3.49 is recognized by having his name placed on the list of scholars.

A student who takes less than 8 semester hours a term and establishes a GPA of 3.00-3.49 at the end of the term in which a cumulative total of at least 8 semester hours are completed, will have his name placed on the list of scholars. For this purpose, a part-time student's work will be considered in blocks that do not overlap.

Graduation with Honors
A student graduating at the bachelor's level with a GPA of 3.20 up to 3.50 will be graduated cum laude; a student with a GPA of 3.50 up to 3.80 will be graduated magna cum laude; a student with a GPA of 3.80 or higher will be graduated summa cum laude.

In determining eligibility for honors, a student's overall GPA as well as his GPA on work taken at UAH will be computed and both computations must fall within the specified range.

Honor designations will appear on transcripts, commencement programs and diplomas.

Honors Convocation
The University faculty recognizes and honors those students who have attained academic excellence at a convocation held in the spring of each year. At the Honors Convocation, students who have been inducted into the honor societies, who have been named to the dean's list in each college, and who have attained excellence in academic programs are recognized.

Graduate Dean's List
A graduate student who has a minimum grade point average of 3.85 on all graduate work and has completed at least twelve semester hours of graduate work at UAH and has a grade point average of 4.0 on the last twelve semester hours of graduate work is eligible for the Graduate Dean's List which is compiled by the School of Graduate Studies each term.
Academic Probation and Suspension

In order to remain in good academic standing, an undergraduate student must maintain an average of 2.0 (C) on all work attempted at UAH, within the University of Alabama System, as well as on all college work attempted.

At any point that a student's cumulative grade point average, either overall or at UAH, falls below 2.0 (C), the student will be placed on scholastic probation. (See exception applied to freshmen below.)

If a student's grade point average on one term (minimum load 8 hours, accumulated for part-time students) is below 1.0 (D) with the cumulative GPA greater than 2.0, a warning message will be printed on the student's grade report, and a list of such students provided to the school deans.

A beginning freshman will be reviewed for the first time at the end of the term in which he has attempted a total of 8 semester hours of work (accumulated for part-time). At this point, if the student has at least a 1.0 but less than 2.0, he is placed on academic warning and referred for appropriate advising. If such a student has a GPA of less than 1.0, he is placed on scholastic probation.

Once a student is placed on scholastic probation, such a student is reviewed in intervals of a minimum of 8 semester hours of work attempted (accumulated for part-time students). At such review points, three actions are possible:

1. If cumulative GPA is 2.0 on all work and on UAH work, student is removed from probation.
2. If cumulative GPA is less than 2.0 on all work, but block of work being reviewed is 2.0 or higher, student is continued on probation.
3. If cumulative GPA is less than 2.0 on all work or on UAH work and GPA on block of work being reviewed is less than 2.0, student is suspended.

A regularly admitted student suspended for the first time is automatically eligible to re-enter the second term following such suspension. A student admitted in any special category and suspended for the first time must petition the Admissions Committee for permission to re-enter after an absence of at least one term.

A student suspended the second time within the University of Alabama System is disqualified for readmission. After a period of one year, such student may petition for re-admission. Individual schools may have additional requirements specific to their programs. Refer to school sections.

Indeterminate Academic Status Policy

For the purpose of determining academic status of those students on academic probation, a grade of I or X will be treated as a grade of F. Credit hours attempted will be charged to the student and zero quality points will be earned for the I and/or X. The action of Academic Suspension will be exercised when the results of calculation of grade point average (with the I or X treated as a F) indicates such action to be appropriate (See Academic Probation and Suspension section of the catalog). When the I or X is remedied and the grade change reported to the Office of Records, grade point average and subsequent standing will again be determined.

Conditional/Probational to Regular Status

Students admitted on condition or probation will be evaluated for regular student status after earning 15 or more hours at UAH. If the student at that time has earned a 2.00 on all UAH coursework, the Conditional/Probational classification will be changed to regular student status. The special student is not required to initiate this change. Each student's record is reviewed via computer after each term.
Nondegree to Regular Status
A nondegree student will be evaluated for regular admission when all necessary regular admission application materials are received by the Office of Admissions.

Academic Appeal Process
Academic appeals will originate in written form by the student and will be processed through the chair of the student’s major department, the dean of the college, and the Office of Academic Affairs, in that order. Students classified as “special” will be routed through the most appropriate academic dean, but should begin by contacting the Academic Advisement and Information Center, 895-6290. Students should contact their major advisor for assistance.

Pass-Fail Option
To be eligible to take courses on a P-F basis, a student must: (1) have junior or senior standing; (2) not be on probation; (3) have an approved major or program plan appropriately filed. A student is limited to 12 semester hours of credit on a P-F basis. P-F system applies only to courses chosen as electives. Some departments limit P-F option to electives outside the department or school.

A grade of P may be changed to a regular grade only if the student changes his program to an area in which a regular grade is required. The change must be initiated at the dean’s office and must go through the normal grade change procedures. Once a P grade has been changed to a regular grade, it must remain.

Under the P-F system, a grade of P will not be counted in a student’s GPA; a grade of F will be counted in a student’s GPA.

A student wishing to exercise a P-F option must make application at the Office of Registrar (UCl119) before the end of the late registration period.

Even though a student chooses to take elective courses on the P-F basis, instructor’s grade sheets will reflect the actual grade and the student may be informed of the regular grade upon request.

Visiting Student Program
Undergraduate
A cooperative arrangement exists with Alabama A&M University, Athens State College, Calhoun Community College, Oakwood College and the University of Alabama in Huntsville. A similar arrangement exists with the University of Alabama in Tuscaloosa and in Birmingham. Under either of these arrangements, a student at any of the participating institutions may request permission to attend a course at one of the other schools. Conditions governing the granting of permission include the following:

1. The student must be a full-time student or a full-time University employee who is a part-time student.
2. The course desired must be unavailable at the student’s home institution.
3. Visiting students are limited to one undergraduate course a term at the host institution except where the second course is a laboratory required to accompany the first course or the second course is a one hour course in basic military science.
4. The student must have an overall C average.
5. The student’s request must be approved by his adviser and other appropriate personnel.
6. Permission of the host institution is dependent upon availability of space for the visitor after its own students are accommodated.

Any student interested in participating in the Visiting Student Program should contact the Office of Student Records for information regarding the procedures to be followed.
Graduate

A cooperative arrangement exists with Alabama A&M University. Any student interested in participating in this program should consult the School of Graduate Studies section.

Army ROTC

Through the visiting student program, students at the University of Alabama in Huntsville may enroll in the ROTC Program in the Department of Military Science at Alabama A&M University. A prescribed course of study under the program prepares graduates for positions of officer leadership within the national defense structure. Depending upon qualifications students may enroll either in a basic or advanced course of study in the ROTC Program. Specific requirements and a description of the courses of study are provided in the current Alabama A&M bulletin. Students interested in participating in this program should contact the Office of the Professor of Military Science at Alabama A&M University and the Office of Student Records at the University of Alabama in Huntsville.

Air Force ROTC

Air Force ROTC is available to students through a Cooperative Program with Samford University.

The Division of Aerospace Studies was established at Samford University in 1972. Qualified men and women students may be commissioned as second lieutenants in the United States Air Force by completing the Professional Officer Course (last two years of Air Force ROTC). After graduation, participants enter active duty as nurses or engineers or for training as pilots, navigators, missile officers or in numerous other career areas.

Note: Students must travel to Samford University for all classes. Call (205) 870-2859 for complete enrollment information.

Cooperative Education (Co-op) Program

The UAH Cooperative Education (Co-op) Program provides the opportunity for the academic work of qualified students to be enriched with productive periods of practical experience in business, industry, and government. Most students participating in the UAH Co-op Program alternate terms of full-time study with terms of full-time career-related work with leading employers in the Huntsville area. In addition to gaining practical experience in a field directly related to their major, Co-op students earn sufficient money to pay a substantial portion of their University expenses. At graduation, the majority of UAH Co-op students are offered full-time permanent employment with their Co-op employer.

Students majoring in all undergraduate disciplines are potential candidates for Co-op positions if they meet the program's academic requirements. Any currently enrolled UAH student may apply to the program if the student has a minimum of 16 hours college credit, at least eight hours earned or in process at UAH, and if the student has an overall quality point average (QPA) of at least 2.5 on the 4.0 scale. Students also are obligated to the University and the employer to continue with the same company until graduation.

A Graduate Co-op Program is also offered for those students pursuing a graduate degree. Students who have been admitted to the School of Graduate Studies as a degree candidate may apply for admission to the Graduate Co-op program. Upon completion of six (6) graduate hours applicable to his/her approved program of study, with a minimum of a 3.0 grade point average (GPA) on that graduate coursework, the student will be considered a candidate for Graduate Co-op positions.

The UAH Co-op Program is open to UAH students, regardless of race, color, religion, sex, age, national origin, handicap or veteran status.

For more information, contact the Cooperative Education Office, The University of Alabama in Huntsville, Huntsville, AL 35899. The telephone number is (205) 895-6741.
Second Bachelor's Degree

A student who holds a bachelor's (or higher) degree from another institution and who wishes to earn a second bachelor's degree at UAH, must request a detailed evaluation of his previous record before he may officially declare a major.

The program for the second bachelor's degree must meet all requirements imposed on transfer students, e.g., hours in residence, (see Total Degree Requirements section), upper level hours, appropriate major and minor or cognate studies).

After a student has earned one bachelor's degree at UAH, he may qualify for a second bachelor's degree by completing (in addition to credits earned while pursuing the first degree) in residence a minimum of 25 percent of the total degree requirements for the second degree. The second degree must include a new major. The student must meet all other applicable requirements for the degree. Excess credits earned while pursuing the first degree are not applicable to the second degree.

Time Limit

The degree requirements for graduation are normally those specified in the catalog in effect when a student first enters UAH as a degree seeking student. At any time during the student's enrollment that requirements for graduation are changed, a student may elect to graduate under the new requirements.

If the student does not complete requirements for graduation within seven years from the date of entry or seven years from the date of the catalog chosen, the student must then change to the catalog in effect and meet the requirements as specified. If a student breaks enrollment for a period of at least 24 months, the student must then change to the catalog in effect at the time of re-enrollment and meet the requirements as specified.

Any exceptions to this policy must be approved by the student's faculty advisor and college dean with the proper notation filed in the student's program of study in the Registrar's office. At any point in which a change in catalog becomes necessary, a new program of study must be completed and proper notation filed in the Registrar's Office.

Transcripts

Official transcripts are issued and sent by the Office of Student Records to recognized institutions and agencies which require such documents. Transcripts are issued only upon the written request of the student involved.

Official transcripts are not issued to the individual student; however, he may request an unofficial transcript which does not bear the University seal.

No transcript will be issued for a person who has a financial obligation to the University.

Concurrent Enrollment

Transfer credit for courses taken at other institutions by a student concurrently enrolled at The University of Alabama in Huntsville will be accepted only if prior approval has been given by the UAH Chairperson of the Department where the course is taught and by the Dean of the College in which the student is enrolled.

64 Hour Transfer Limit

Once a student has enrolled and has accumulated a total of 64 semester hours of credit from all sources no additional credit may be transferred to UAH from a two-year institution. Exceptions to this policy must be approved prior to taking additional course work. Requests for exceptions must be in writing and approved by the UAH chairperson of the department where the course is taught, and by the dean of the college in which the student is enrolled.
Correspondence Study and Other Nonresident Credit.

Up to 25 percent of the credit applied toward a baccalaureate degree may be earned by means other than residence credit at an approved institution. Examples of other means are credit by examination, correspondence study, educational experiences in the armed forces, and professional certificate programs. Persons interested in taking correspondence study courses through the University of Alabama in Tuscaloosa may write to the College of Continuing Studies, Independent Study Division, University of Alabama, P.O. Box 2967, University, Alabama 35486.

Course Numbering System

<table>
<thead>
<tr>
<th>Range</th>
<th>Year Student Normally Takes Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>001-099</td>
<td>Refresher (noncredit)</td>
</tr>
<tr>
<td>100-199</td>
<td>Freshman</td>
</tr>
<tr>
<td>200-299</td>
<td>Sophomore</td>
</tr>
<tr>
<td>300-399</td>
<td>Junior (upper level)</td>
</tr>
<tr>
<td>400-499</td>
<td>Senior (upper level)</td>
</tr>
<tr>
<td>-599</td>
<td>Advanced undergraduate credit or graduate credit, according to the Colleges of Engineering and Administrative Science—graduate credit only. Colleges of Liberal Arts, Nursing, and Science may be either undergraduate or graduate credit. Check course listing for specification.</td>
</tr>
<tr>
<td>-799</td>
<td>Graduate (NPG and advanced undergraduate students only by special permission.)</td>
</tr>
</tbody>
</table>

Undergraduate Colleges, Majors and Degrees

Detailed information concerning the various degree programs, including course descriptions, is organized according to colleges. See the table of contents for the listing of colleges.

The undergraduate academic programs of the University of Alabama in Huntsville are administered by five colleges with the following approved major programs:

College of Administrative Science

Areas of study in which majors are currently offered are:
- Accounting
- Economics
- Finance
- Management

Courses are also offered in business law and management science.

College of Liberal Arts

Areas of study in which majors are currently offered are:
- Art
- Communication Arts
- Education
- English
- Foreign Language/International Trade
- French
- German
- History
- Music
- Music Education
- Political Science
- Psychology
- Russian Area studies
- Sociology

Other areas with course offerings are Japanese, Latin, linguistics, philosophy, Russian, Spanish and physical education.
College of Engineering
Areas of study in which majors are currently offered are:
Chemical Engineering          Industrial and Systems Engineering
Civil Engineering            Mechanical Engineering
Computer Engineering        Optical Engineering
Electrical Engineering

College of Nursing
All majors receive instruction in the theory of nursing as well as laboratory practice in a variety of clinical settings to prepare them for beginning-level practice in professional nursing. Graduates of this first professional degree are qualified to apply for licensure as registered nurses.

College of Science
Areas of study in which majors are currently offered are:
Biological Sciences         Mathematics
Chemistry                   Mathematics Education
Computer Science           Optical Science
                           Physics
Courses are also offered in atmospheric and environmental science, and statistics.

Degrees Offered
Programs are provided as indicated below for the undergraduate degrees of Bachelor of Arts, Bachelor of Science, Bachelor of Science in Business Administration, Bachelor of Science in Engineering, and Bachelor of Science in Nursing.

Bachelor of Arts — Art, art education, biological sciences, communication arts, economics, education, English, foreign language/international trade, French, German, history, mathematics, mathematics education, music, music education, political science, psychology, Russian area studies, sociology
\nBachelor of Science — Biological sciences, chemistry, computer science, education, mathematics, mathematics education, optical science, physics.

Bachelor of Science in Business Administration — Accounting, economics, finance, management, management information systems, marketing, procurement management.

Bachelor of Science in Engineering — Unified programs with professional specializations.

Bachelor of Science in Nursing — Unified professional curriculum.

Declaring a Major
Students should declare a major by the end of the freshman year. When the student declares a major, the student will be assigned an adviser by the relevant dean/department chairman. At that time the complete advising folder will be transferred from the Academic Advisement and Information Center (AAIC) to the relevant dean or department chairman’s office for permanent retention. Sophomores who have not declared a major will continue to have their registration cards signed in the AAIC.

Program of Study
The Program of Study Form is a document prepared cooperatively by a student and a responsible faculty adviser, with the prior assistance of the Office of Student Records in preparing the evaluation of transfer credits and reviewing general education requirements. Academic departments of colleges must assume responsibility for ensuring that each of their students has an opportunity to develop a Program of Study form before the end of the student’s sophomore
year. Once the Program of Study form has been accurately completed, checked in the dean’s office, and signed by the appropriate individuals, it becomes a contract between the student and the university with responsibilities bearing on both parties.

**Double Major**
With approval of the two appropriate departments, a student who wishes to concentrate in two disciplines may pursue a program of study that leads to a B.A. or B.S. degree with a double major. The minor requirement is waived for students with double majors. General education requirements and all requirements stipulated for each of the two majors must be completed. The total requirements of some programs may exceed 128 semester hours.

**Change of College**
Students who are pursuing a program of study in one college at UAH and desire to change to a program in another college may petition to do so by making application at the Office of Student Records. Academic advisement before changing programs may help students avoid losing credits. Application of previously earned credits toward the new program will be determined after the transfer has been approved.

**Application for Graduation**
Candidates for graduation must file their application at least six months prior to the time requirements are expected to be completed. Application forms may be obtained at the Office of Student Records. Early application will assist the student by confirming requirements remaining to be completed.

Students completing degree requirements in any term other than spring and fall terms will be given certified letters of completion and will receive diplomas at the next graduation ceremony.

**Total Degree Requirements**
1. Minimum requirements for the Bachelor of Arts, Bachelor of Science, Bachelor of Science in Business Administration, and Bachelor of Science in Nursing degrees are 128 semester hours; for the Bachelor of Science in Electrical and Industrial and Systems Engineering degree, 129 semester hours; for the Bachelor of Science in Chemical Engineering, 134 semester hours; for the Bachelor of Science in Civil and Mechanical Engineering degree, 133 semester hours; and for the Bachelor of Arts in Music, 134 semester hours. A minimum of 25 percent of the total requirements and 12 of the last 18 hours must be completed at UAH. Also, unless otherwise specified by the department involved, a minimum of 12 semester hours of upper-level courses numbered 300 or above must be completed at UAH in a student’s program (6 hours in his major and 6 hours in his minor or cognate studies). A minimum of 30 percent of the total degree requirements must be taken in courses numbered 300 or above.

2. The maximum amount of correspondence or credit by examination allowed towards a bachelor’s degree is 25 percent of the degree requirements.

3. An overall average of C is required for all courses taken: (a) at all institutions; (b) at UAH; (c) in all courses in the major discipline taken at UAH, and also in all courses taken in the major discipline, including UAH courses and transfer courses; and (d) in all courses in the minor discipline taken at UAH, and in all courses taken in the minor discipline including UAH courses and transfer courses; or in all courses listed in the cognate studies option taken at UAH, and in all courses listed in the cognate studies option, including UAH courses and transfer courses.

4. Additional degree requirements for each degree are described in the appropriate sections of this catalog.
Requirements for Programs of Study Leading to the B.A. Degree

General Education Requirements for B.A. Degree

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Composition: EH 101-102. Students in the Honors Program may substitute EH 105H</td>
<td>6</td>
</tr>
<tr>
<td>Survey of Literature: EH 205-206 or EH 205-241 or EH 205-230 or EH 206-240 or EH 230-240 or EH 250-251. Students in Education must choose EH 205-230</td>
<td>6</td>
</tr>
<tr>
<td>Origins and Development of the Contemporary World: Hy 101-102</td>
<td>6</td>
</tr>
<tr>
<td>Foreign Languages: Two courses at 200-level (or placement at that level): French, German, Japanese, Latin, Russian, Spanish</td>
<td>6</td>
</tr>
<tr>
<td>Fine Arts: One course chosen from ARH 100, ARH 101, ARS 110, MU 100, MU 110, CM 122</td>
<td>3</td>
</tr>
<tr>
<td>Lower-Level Humanities: PHL 101 or a 200-level course in English, History, or Philosophy (excluding PHL 201 outside the major and minor except for students completing all requirements for teacher certification)</td>
<td>3</td>
</tr>
<tr>
<td>Upper-level Humanities or Fine Arts: One course chosen from English (excluding EH 300, 301 or 302), History, Music, Philosophy, Art, Foreign Language literature courses, or Communications 309 or 322, outside the major and minor except for students completing all requirements for teacher certification</td>
<td>3</td>
</tr>
<tr>
<td>Mathematics: One course at Level II or above</td>
<td>3</td>
</tr>
<tr>
<td>Science: Two courses in a single discipline and one course in a second laboratory science chosen from Astronomy, Biological Sciences, Chemistry, Environmental Science, or Physics</td>
<td>12</td>
</tr>
<tr>
<td>Social Science: Four courses chosen from PSC 101, PSC 135, SOC 100, SOC 200, PY 103, ECN 142, ECN 143. May be included in the major and minor. Students completing all requirements for teacher certification may substitute ED 230 and ED 263 for any two of these courses except one economics course which is required for education students</td>
<td>12</td>
</tr>
<tr>
<td>Upper-level Social Science: One course chosen from Political Science, Psychology, Sociology, Economics, outside the major and minor except for students completing all requirements for teacher certification</td>
<td>3</td>
</tr>
</tbody>
</table>
Additional Requirement: One course chosen from MA 151 or above, PHL 201, ST 281, AHS 300, CS 100 or 108. Students who complete all requirements for teacher certification may substitute ED 360 or ED 510. ................................................................. 3

*Students in the Honors Program may substitute H399.

Major Requirements for B.A. Degree ................................................................. 30-37
A minimum of 30 semester hours in a program of study in a single department with at least 21 of those hours 300-level or above. Consult individual departments for specific requirements.

Minor Requirements for B.A. Degree ............................................................. 18-21
A minimum of 18 semester hours in a single discipline with a minimum of 12 hours at the 300-level or above. Consult the Math Department for an exception.

In lieu of a minor, students may choose a minimum of 21 semester hours in cognate studies drawn from two closely related disciplines. A minimum of 12 hours must be 300 level of above. Cognate studies must be approved by the major department.

Electives
The student may select any elective courses outside the major and minor as needed to complete the University requirement of a minimum of 128 hours for graduation. A minimum of 39 hours of course work in the program of study must be upper level.

Minimum Degree Requirements ........................................................................ 128

Requirements for Programs of Study Leading to the B.S. Degree

General Education Requirements for B.S. Degree

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Composition: EH 101-102. Students in the Honors Program may substitute EH 105H</td>
<td>6</td>
</tr>
<tr>
<td>Survey of Literature: EH 205-206 or EH 205-241 or EH 205-230 or EH 206-240 or EH 230-240, or EH 250-251. Students in Education must choose EH 205-230</td>
<td>6</td>
</tr>
<tr>
<td>Origin and Development of the Contemporary World: HY 101-102.</td>
<td>6</td>
</tr>
<tr>
<td>Foreign Languages and Communication Skills: Two semesters of foreign language at the 200 level or three courses in communication skills: CS 108 or CS 113, CM 113, EH 301.</td>
<td>6-9</td>
</tr>
<tr>
<td>Fine Arts: Two courses chosen from ARH 100 or ARH 101, MU 100 or MU 110, PHL 101, PHL 202, or PHL 311.</td>
<td>6</td>
</tr>
</tbody>
</table>
Social Sciences: Two courses in one discipline chosen from Economics, Political Science, Psychology, or Sociology

Mathematics: One course at level II or above. Consult individual departments for specific requirements.

Laboratory Science and Technical Studies
a) Two courses in a single laboratory science outside the major and minor drawn from Astronomy, Biological Sciences, Chemistry, Environmental Science, or Physics
b) Coursework including at least one lab in any department or program outside the major and minor in the Colleges of Science or Engineering.

Major Requirements for B.S. Degree: See Specific Disciplines

Minor Requirements for B.S. Degree: See Specific Disciplines

Electives: Sufficient courses to meet minimum 128 hour-degree requirement.

Requirements for Programs Leading to B.S.B.A., B.S.E., and B.S.N. Degrees

Requirements for professional programs offered are described in the appropriate sections of this catalog. These programs include the Bachelor of Science in Business Administration, the Bachelor of Science in Engineering, and the Bachelor of Science in Nursing.

Honors Program
Dr. Ann Boucher, Director
Morton Hall 336

The Honors Program at The University of Alabama in Huntsville provides academically talented undergraduate students with opportunities to develop their special talents and skills within an expanded and enriched version of the curriculum. Over the periods of their participation, students in the Honors Program pursue structured enrichment activities, Honors coursework that parallels regular offerings, special interdisciplinary seminars, and enhanced opportunities for independent study and research. Participating students also will find reward in the direct contact the Honors Program affords with other talented and highly-motivated students and with faculty.

Students who wish to participate fully in the Program will earn by graduation a minimum of thirty hours in Honors coursework. Individual courses of study will vary; however, all students should plan to take six hours of Honors Forum, and many Honors students, depending upon their points of entry into the program, will take Honors English Seminar (EH 105H), an Honors calculus course, two Honors interdisciplinary seminars, and an Honors Senior Project. Careful advisement is provided so that students can work out efficient and challenging courses of study that meet their degree requirements.

The Honors Program serves excellent students in all the colleges. Entering freshmen are invited to participate based on an evaluation of ACT or SAT scores and high school grades. Other students are admitted based on outstanding college performances. Students with cumu-
lative college grade point averages of 3.3 or higher after earning 9 hours of credit at UAH are urged to discuss with the director how they may best participate in the Honors Program.

It is expected that Honors students will be awarded financial aid under one of UAH's several programs to assist the academically talented. Students should discuss their financial aid needs with the director of the Honors Program or the director of Financial Aid.

Honors courses are offered in many disciplines. Please check the course schedules of each term or call the Honors Program for complete course listings. Honors versions of some general education courses are among the Program's offerings. To review these courses, students should check the listings of courses provided in this catalog for each department. Other courses that have been developed for the Honors Program are listed below. University students who meet appropriate admissions standards for the Honors Program may enroll in Honors courses. Students desiring to do so must contact the Honors Director.

Honors courses include:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>H 100</td>
<td>Honors Forum</td>
<td>1 hour</td>
</tr>
<tr>
<td>EH 105(H)</td>
<td>Honors English Seminar</td>
<td>3 hours</td>
</tr>
<tr>
<td>EH 250(H)</td>
<td>Honors World Literature I</td>
<td>3 hours</td>
</tr>
<tr>
<td>EH 251(H)</td>
<td>Honors World Literature II</td>
<td>3 hours</td>
</tr>
<tr>
<td>H 399</td>
<td>Honors Interdisciplinary Seminar</td>
<td>3 Hours</td>
</tr>
</tbody>
</table>

Honors Forum:
Regularly scheduled enrichment experiences for Honors Program students using lectures, concerts, exhibits, and other events. The course provides exposure to a broad range of University disciplines. Prerequisite: admission to Honors Program.

Honors English Seminar:
(See offerings of the Department of English) Required for all students who enter the Honors Program before completing freshman English.

Honors World Literature I:
The course focuses on major texts from the ancient world to 1700. Honors English 250 and 251 meet sophomore level literature requirements for the BS and BA degrees and constitute a sequence for Engineering students.

Honors World Literature II:
The course focuses on major texts from 1700 to the present.

Honors Interdisciplinary Seminar:
Interdisciplinary study of a selected topic. The Seminar will facilitate serious appraisal of an issue that crosses disciplinary boundaries and that can be explored using different scholarly methodologies.

For more information concerning the Honors Program, please write the Director of the Honors Program, The University of Alabama in Huntsville, Huntsville, Alabama 35899; or telephone 205-895-6450.

Professional Preparatory Programs

Prelaw Program
To be admitted to an accredited law school, the student must have a bachelor's degree, an acceptable score on the Law School Admissions Test (LSAT), and, in most cases, an accumulative grade-point average of B or better. The LSAT should be taken in June or October of the year before the student plans to enter law school. Applications to law school, together with test scores, transcripts, and recommendations, should be submitted to law schools no later than January 1 of the year the student plans to begin law school. For specific admission requirements, the student should consult the catalog of the law school he wishes to attend.
In pursuing a prelaw program at the University of Alabama in Huntsville, the student will find that the best preparation during the first two years is through the completion of the general education requirements. The Statement on Prelegal Education of the Association of American Law Schools notes that "What law schools seek in their entering students is not accomplishment in mere memorization but accomplishment in understanding, the capacity to think for themselves, and the ability to express their thoughts with clarity and force." The prelaw student therefore must develop perception and skill in the English language, insight into the institutions and values with which people are concerned, and the power to think clearly, carefully, and independently. Since these skills are fostered by the general education requirements, completion of them should be the primary concern of the beginning prelaw student.

No law school recommends a particular major or minor as preparation for admission. Students should therefore design their Area of Concentration with the aim of further development and promotion of the skills listed above. Care should be taken in choosing electives. Aside from the courses in the general education requirements, the prelaw program should include courses in political science, economics, philosophy (especially logic), American History, English, statistics, and computer science. One course in accounting is recommended. Since admission to law school is highly competitive, completion of recommended programs and requirements will not necessarily insure admission.

All prelaw students should seek academic counseling from prelaw advisers in the Departments of English, History, and Political Science. Materials and information are available in these departments or in the Academic Advisement and Information Center. The official Prelaw Handbook may be consulted in these offices or ordered from the Law School Admissions Services, Box 2000, Newtown, PA 18940.

Premedical and Predental Programs

Most students entering medical or dental schools do so after earning an undergraduate degree. After consulting the specific requirements of the desired medical or dental school, applicants interested in careers in medicine or dentistry will find that UAH offers programs that will prepare them for admission to the professional school.

Competition for admission to medical and dental schools is intense and students should realize that completion of the admission requirements does not insure acceptance. Since admission to the schools is not assumed, students are advised to complete undergraduate degree requirements.

Typical of the requirements for admission to medical colleges are those which follow for the University of Alabama School of Medicine.

1. Two academic years of English
2. One and one-half academic years of general biology or zoology plus electives
3. One academic year of general inorganic chemistry (including qualitative analysis and laboratory work)
4. One academic year of organic chemistry with laboratory work
5. One academic year of physics with laboratory
6. College algebra and calculus

In addition many medical schools require that students take one year of physical chemistry. Students are encouraged to take as broad a curriculum as possible. To reduce duplication in later work, genetics, cellular and developmental biology, and cellular physiology are recommended as electives in life sciences. A student is advised to choose his program according to his individual interest and ability so that he may fulfill his maximum academic potential.

The UAH School of Primary Medical Care offers for selected UAH undergraduates several courses that are designed to assist pre-health professional students to increase their awareness of the health professions, problems, and issues. These courses are described in this catalog's
School of Primary Medical Care section, which also includes descriptions of the school's medical student and resident programs.

Typical of the requirements for admission to dental schools are these which follow for the School of Dentistry of the University of Alabama in Birmingham:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Biological sciences</td>
<td>8</td>
</tr>
<tr>
<td>2. Inorganic chemistry (including qualitative analysis)</td>
<td>8</td>
</tr>
<tr>
<td>3. Organic chemistry</td>
<td>8</td>
</tr>
<tr>
<td>4. Quantitative analysis</td>
<td>4</td>
</tr>
<tr>
<td>5. Physics (including laboratory)</td>
<td>8</td>
</tr>
<tr>
<td>6. College algebra and trigonometry</td>
<td>6</td>
</tr>
<tr>
<td>7. 30 semester hours of nonscience courses to include 6</td>
<td>30</td>
</tr>
<tr>
<td>(preferably 12) semester hours in English. It is</td>
<td></td>
</tr>
<tr>
<td>recommended that students complete 12 semester hours in</td>
<td></td>
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<tr>
<td>a foreign language and include as many courses in history,</td>
<td></td>
</tr>
<tr>
<td>political science, economics, philosophy, psychology, and</td>
<td></td>
</tr>
<tr>
<td>sociology as possible</td>
<td></td>
</tr>
<tr>
<td>8. The completion of a minimum of 90 semester hours of collegiate work.</td>
<td></td>
</tr>
<tr>
<td>Students should elect courses in mathematics through calculus and</td>
<td></td>
</tr>
<tr>
<td>should not elect biological sciences courses that constitute a part of</td>
<td></td>
</tr>
<tr>
<td>the dental school curriculum. Students interested in preprofessional</td>
<td></td>
</tr>
<tr>
<td>health programs (predentistry, premedicine, preoptometry, pre-veterinarian medicine) are encouraged to contact the preprofessional adviser by calling the Office of the Dean, College of Science, phone 895-6605.</td>
<td></td>
</tr>
</tbody>
</table>
College of Administrative Science

Dean C. David Billings, B.S., Ph.D., Professor of Finance
Assistant Dean R. Eugene Bryson, B.B.A., M.B.A., Ph.D., C.P.A., Associate Professor of Accounting.

Mission

The College of Administrative Science is a professional school with the mission to disseminate and develop knowledge which contributes to the education of competent, creative, and socially responsible managers for careers in private and public sectors with specific emphasis on the management of technology. This mission is influenced by today's rapidly changing environment, which is increasingly oriented toward the application of advanced technology in organizations. This mission is also influenced by the location of the College in the third largest economic and cultural center in the State of Alabama, in a leading advanced technology center and a major space center in the nation. The faculty is committed to programs and activities that will help increase the contribution that this urban center makes to the economic and professional development of the state and nation.

In fulfilling its mission the College seeks to accomplish three major objectives in instruction, research and service. These objectives are:

1. To provide quality programs of undergraduate and graduate instruction in educating persons for the practice of administration at all levels of responsibility in diverse organizations;
2. To produce research which furthers the accumulated knowledge and/or contributes to the practice of the respective disciplines represented in the College.
3. To render public service to business, industry and government in the region and to conduct productive applied research which serves the technology industry and public sector organizations in the region. In addition, faculty involvement in professional societies is emphasized.

The programs to achieve these objectives recognize the needs of specific constituencies, including minority groups; women; part-time, working and adult students. There is also a special obligation to provide applied research and public service to broad groups through bureaus, centers, and institutes. The College is committed to serve society beyond the campus through professional development programs and to apply knowledge and expertise to the solution of problems of people, urban areas, rural areas, public bodies, and state and federal agencies whenever
there are needs in which the College can be helpful.

**Accreditation and Membership**

The College is accredited by the Southern Association of Colleges and Schools.

The College of Administrative Science is a member of the American Assembly of Collegiate Schools of Business (AACSB) which is a not-for-profit corporation of educational institutions, corporations, and other organizations devoted to the promotion and improvement of higher education in business administration and management.

The College is an associate member of the Association for University Business and Economic Research (AUBER) which is the professional association of business and economic research organizations in universities in America and six other countries.

The College is a member of the National Association of Management and Technical Assistance Centers which is a non-profit association of management and technical assistance centers devoted to marshalling the resources of institutions of higher education to accelerate the economic development process.

**Center for High Technology Management and Economic Research**

The Center’s mission is to serve the business community, federal, state and local governments, individuals and the University through management and technical assistance, dissemination of economic and socio-economic information, and support for faculty in seeking funding for research projects. Special emphasis is placed on businesses in technological fields. In addition, the center staff does contract research on business and economic problems for governmental organizations and private industry. The center publishes the results of its research as monographs so that significant developments in business and economics can achieve wide exposure. The center is an associate member of the Association for University Business and Economic Research (AUBER), a member of the Southern Technology Applications Center, and a member of the NASA Technology Transfer Network.

All graduate faculty members in the College of Administrative Science are staff members of the Center for High Technology Management and Economic Research.

The purposes of the center are:

- To offer technical and management assistance to new and emerging high technology businesses throughout Alabama;
- To provide managerial and technical assistance to entrepreneurial ventures in North Alabama;
- To conduct research on the business and economic environment of the Huntsville area, Alabama, and the Southeast region of the United States;
- To encourage and promote research by the College’s faculty members;
- To render technical assistance to faculty members and assist in securing funds for research projects;
- To publish monographs and other materials of practical use to business and government; and
- To plan and promote conferences and seminars conducted in the College.

A major subsidiary program is the Small Business Development Center (SBDC), which provides managerial and technical assistance to entrepreneurial ventures in North Alabama. The SBDC advises potential and established entrepreneurs, assists in the development of private-sector jobs, and advocates the free enterprise system.

The staff of the Center’s Business and Economic Research Unit analyzes the business and economic environment of the Huntsville area, the state of Alabama and the southeast region of the United States. This unit provides a data base of statistical information and prepares research studies and statistical information on economic development in such areas as labor resources, transportation capabilities, financing, industrial sites, business services, public policy questions, science and technological services.
Faculty members work closely with the Cognitive Systems, Systems Simulation and Technology Transfer Laboratories on joint faculty research projects and supporting graduate assistantships.

The Cognitive Systems Laboratory's research is focused on knowledge based expert systems emphasizing the cognitive systems aspect of detecting and understanding the environmental domain. Numerous expert systems have been prototyped within the laboratory in the areas of diagnostics, classification, natural language understanding, process control, decision support, and productivity enhancement.

The Systems Simulation Laboratory's research is focused on using simulation for space, military and industrial applications. One research aspect is the coupling of simulation with artificial intelligence and expert systems. Research projects include graphical simulation of space station docking, flexible manufacturing system simulation, mobile robotic vehicle simulation and manufacturing/production system simulation.

The Technology Transfer Laboratory's focus is on working with companies to identify how the introduction of existing technology can improve their production processes.

Executive Education Program

The Executive Education Program is designed to assist the members of the business, industry and governmental communities in keeping abreast of changes in a complex environment. The College of Administrative Science in cooperation with the Division of Continuing Education's Office of Management Studies offers an interactive blend of management educational programming ranging from one-session seminars on specific problems to a substantial sequence of classes custom tailored for corporate and governmental audiences. For more information, call the Office of the Dean (205-895-6735).

Degrees Offered

Bachelors. The College of Administrative Science offers two undergraduate degrees, the Bachelor of Science in Business Administration (BSBA) and the Bachelor of Arts (BA) in economics. The BSBA encompasses majors in accounting, economics, finance, management, management information systems, marketing, and procurement management (purchasing and contract management).

Students may obtain a second bachelor's degree in the College of Administrative Science if they:

1. Complete, in addition to credits earned while pursuing the first degree, in residence a minimum of 25 percent of the total degree requirements for the second degree;
2. Include a new major in the second degree;
3. Satisfy the College's general and major degree requirements in effect at the time they embark on the program leading to the second degree.

Masters. The College's Graduate Program offers a Master of Science in Management for qualified students desiring advanced work in management. This program encompasses specializations in accounting, management, management information systems, and project management.

Highly qualified students enrolled in the BSBA undergraduate program of the College of Administrative Science may be able to complete the requirements for a master's degree by completing one additional year of course work beyond the bachelor's level. BSBA seniors who are interested in obtaining an MSM degree should contact the College's Coordinator of Graduate Advisement in Room 102, Administrative Science Building.

Business Administration Minor

Students from colleges other than Administrative Science may minor in business administration. The minor consists of at least 21 hours, but may be expanded to 30 hours of courses
available in the College of Administrative Science. A baccalaureate program with more than 30 hours or 25 percent in course content or credit hours in subjects commonly available in the College of Administrative Science will be reviewed by the Coordinator of Undergraduate Advisement to determine if it meets the BSBA degree requirements.

Students who choose Business Administration as a minor should take ECN 142 and ECN 143 or ECN 239 to meet their social science degree requirements since these hours are counted within the 30 hour or 25 percent rule. Additional minor courses consist of ACC 211 (Lab ACC 221), ACC 212 (Lab ACC 222), FIN 301, MGT 301, MKT 301, and 9 to 12 hours of College of Administrative Science courses including 6 hours at the 300 or 400 level. The minor program must have the approval of the Coordinator of Undergraduate Advisement.

Pre-MBA. Students who choose business administration as a pre-MBA minor should select the following courses for the 9 to 12 hours of College of Administrative Science electives:
- BLS 211, MIS 301, MGT 450 or MKT 415, and MSC 325.

International Trade. A field major in Foreign Languages and International Trade (FLIT) is offered in cooperation with the College of Liberal Arts’ Department of Foreign Languages for students interested in specializing in a foreign area of the world or in international business, economics or affairs. The major prepares students for careers in international organizations within the U.S. government and in business firms. A broad variety of career opportunities exist in the multinational and multilingual business world. For additional information see the Foreign Languages Department’s section in the catalog.

Pre-Law. The work of successful lawyers has come to be more and more associated with the rendering of opinions and counsel on business matters such as banking, insurance, real estate titles, business contracts, etc. Corporations employ many lawyers full time for their contract and other legal work, and the young lawyer who has a degree in business will be at a distinct advantage in obtaining and doing such work.

Each law school determines its own requirements, such as admission criteria, number and type of semester hours required for entrance, etc. Students planning to enter a law school should be in communication with that school shortly after coming to college to insure the program they take will meet all requirements of the law school the student plans to attend.

For more detailed information the student should read the “Pre-Law Program” section of this catalog.

Students who choose business administration as a pre-law minor should select the following courses for the 9 to 12 hours of College of Administrative Science electives:
- BLS 211, Legal Environment of Business
- BLS 310, Labor Law
- BLS 411, Business Law

Economics Minor
A student wishing to minor in economics may choose 21 semester hours of appropriate courses in economics. The minor program must have the prior approval of the Chairperson of the Department of Economics and Finance.

Economics as a Second Area of Study
Students majoring in Elementary Educations may choose economics as their second area of study. The area of study requires 18 hours of economics courses and the prior approval of the Chairperson of the Department of Economics and Finance.

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Policies, Procedures and Assistance

Course Numbers

Course numbers are coded by prefixes as follows:

- Accounting (ACC)
- Business Legal Studies (BLS)
- Economics (ECN)
- Finance (FIN)
- Management (MGT)
- Management Information Systems (MIS)
- Management Science (MSC)
- Marketing (MKT)
- Procurement Management (PRM)

High School Preparation

An applicant should present a minimum of 16 high school units including specific units as follows (1 unit = 1 year of course work):

- 4 English
- 1 Social Studies
- 1 Algebra
- 1 Geometry
- 9 Electives (8 academic electives. It is recommended that at least one unit should be in Algebra II; one unit in biology; one unit in Chemistry or Physics; three units in social studies including U.S. Government and Economics.)

Total units: 16

Advanced Standing. An applicant will find it advantageous to complete the following recommendations in the choice of high school electives so that advanced standing may be attained and the applicant begin the college program at an appropriate level:

- 4 English
- 4 Social Studies (including U.S. Government and Economics)
- 3 Mathematics (including Algebra I & II, and Geometry)
- 2 Science (Biology and Chemistry or Physics)
- 9 Electives (It is suggested that at least one unit should be in cultural studies such as art, music, drama, humanities, etc.; two units in foreign language; one unit of speech; one-half unit in personal management and one unit in computer literacy using Basic.)

Total Units: 22

Admission as a Freshman

Entering UAH freshmen interested in business administration must meet the general entrance requirements of the University. Students who intend to pursue the BSBA degree should read carefully the section “Admission.”

Students who have had inadequate high school preparation or who are placed in certain lower-level classes because of the results of placement tests may have to take one or more of the following courses:

- EH 003 Basic English no credit
- MA 004 Basic Algebra no credit
- MA 033 High School Geometry no credit
- MA 105 College Algebra 3 hours
- MA 143 Finite Mathematics 3 hours
- MIS 101 Microcomputing I 1 hour
- MIS 102 Microcomputing II 1 hour

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These courses carry the academic credit indicated and will appear on transcripts of students who successfully complete the courses. Since the courses are prerequisite to courses required for the BSBA, credit earned in one or more of the courses may be applied toward the minimum elective requirements for the BSBA.

Management Information Systems Placement Policy
Prior to enrolling in sophomore or upper division Administrative Science courses, each student must demonstrate certain computer skills by completing MIS 101 and MIS 102, or by waivers of MIS 101 and MIS 102 by the Assistant Dean for equivalent high school or college credit, or by successfully passing validation examinations for MIS 101 and MIS 102 administered by the Department of Management Information Systems/Management Science.

Pre-Business Classification
All undergraduate students entering the College of Administrative Science are admitted with a pre-business classification (code 07). Regular students (defined on page 30) remain in this classification until they are admitted to the Upper Division of the College of Administrative Science (code 17). Any request for deviation from these requirements must be petitioned through the College's Office of Academic Assistance.

Students admitted into the pre-business classification may not attempt any business course number above 299.
To have the pre-business classification changed, students should apply through the College's Office of Academic Assistance for admission to the Upper Division of the College. The Registrar's Office cannot make this change.

Special Students
Individuals admitted to the University as Conditional/Probational must have their status changed to regular (defined on page 30) through the UAH Admissions Office and complete all Upper Division admission requirements before applying for admission to the Upper Divisions of the College and choosing a major. Special students may not attempt upper level business courses.

Admission as a Transfer Student
Students planning to transfer into the College of Administrative Science from a two- or four-year institution to obtain the BSBA are advised to follow the transfer program outlined below:

<table>
<thead>
<tr>
<th>Mathematics</th>
<th>(3 hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey of calculus</td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td>(6 hours)</td>
</tr>
<tr>
<td>Composition</td>
<td></td>
</tr>
<tr>
<td>Speech</td>
<td>(3 hours)</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>(6 hours)</td>
</tr>
<tr>
<td>Principles of Economics</td>
<td></td>
</tr>
<tr>
<td>Government, Psychology, Sociology</td>
<td>(6 hours)</td>
</tr>
<tr>
<td>Humanities</td>
<td>(6 hours)</td>
</tr>
<tr>
<td>World History</td>
<td></td>
</tr>
<tr>
<td>Literature</td>
<td>(3 hours)</td>
</tr>
<tr>
<td>Fine Arts</td>
<td>(3 hours)</td>
</tr>
<tr>
<td>Introduction to Philosophy, Logic, or Ethics</td>
<td>(3 hours)</td>
</tr>
<tr>
<td>Laboratory Science</td>
<td>(8 hours)</td>
</tr>
</tbody>
</table>
Business

Introduction to Computers and Information Systems (3 hours)
Business Statistics (3 hours)
Social, Legal and Ethical Environment of Business (3 hours)
Accounting (6 hours)

The specific credit for work done at other institutions which will apply toward the BSBA or BA degree is determined by the College's Coordinator of Undergraduate Advisement. Allowance of transfer credit by the Office of Admissions and Records does not necessarily mean that such credit will be applied toward a BSBA or BA degree. All inquiries concerning the applicability of credit should be made to the College's Coordinator of Undergraduate Advisement (205-895-6024).

Credit for business administration courses taken in schools with American Assembly of Collegiate Schools of Business (AACSB) accredited programs is transferable to UAH. Credit in courses taken in programs without AACSB accreditation may be accepted with approval of the College's Coordinator of Undergraduate Advisement. This policy has been in effect since December 14, 1982.

Course work taken at a junior college after a student has earned more than 64 semester hours of credit may not be accepted for transfer. Courses taken at the lower division at another institution which are upper division courses at UAH will be accepted for transfer only after successful validation.

See the College's Coordinator of Undergraduate Advisement for the policy about specific transfer courses. This policy has been in effect since December 14, 1982.

Admission to the Upper Division

Admission to the Upper Division of the College of Administrative Science is available to students who have:
1. Completed 63 semester hours comprising the Lower Division Requirement.
2. Earned a minimum grade of "C" in both English Composition courses (EH 101-102).
3. Earned a minimum average of "C" (2.0) for the 21 hours comprising the Lower Division Business Administration Core.

Note: For degree-seeking students in the College of Administrative Science admission to the upper division is a prerequisite for all upper division courses (numbered 300-499) in the college. Degree-seeking students in the College registering in upper-level business courses without completing the prerequisites, and being admitted to the upper division will be administratively withdrawn from those classes.

Admission and Academic Standard for Accounting Majors

For a student admitted as a candidate for a Bachelor of Science in Business Administration degree (BSBA) with a major in accounting or a Certificate in Accounting, admission to accounting courses numbered above ACC 301 is predicated upon admission to the Upper Division of the College of Administrative Science and an acceptable score on the Accounting Program Admission TEST (APAT). The student should contact the Testing Office in the University Center to register for the APAT the term in which the student completes ACC 212. A student admitted to the upper division accounting program is required to make a grade of at least a "C" on each accounting course to be applied toward the BSBA degree or the Certificate in Accounting.

Probation and Dismissal

Students are placed on probation at the end of any semester in which they do not have a cumulative grade point average of 2.0. For more detail on the process, see the "Academic Probation and Suspension" section of the catalog.

When dismissed the student must petition the College of Administrative Science for readmission. Application should be made in the Student Records Office, University Center.
Residency Requirement

At least 12 of the last 18 semester hours of a student’s program and a minimum of 32 semester hours of the total degree program must be completed at UAH. For BSBA students, the hours taken in residency must include at least 50 percent of the BSBA program (core curriculum and major option) including a minimum of 12 hours in the major option and 3 hours in MGT 499, Business Policy. Students who are required to take additional courses within the College of Administrative Science in order to meet the residency requirement may be required to complete more than 128 semester hours in order to graduate.

Student Advisement and Enrollment

Faculty advising of students is an integral part of the student’s academic progress and career development. Advising for BSBA and BA degree candidates is handled at various stages of a student’s college career through the University’s Academic Advisement and Information Center (AAIC), the College’s Office of Academic Assistance, and faculty members in the student’s intended major.

First year students are required to plan their course selection with an advisor in the AAIC. After completing the first year of studies (30 semester hours) students seeking a BSBA are advised by the College of Administrative Science’s Coordinator of Undergraduate Advisement in the College’s Office of Academic Assistance (Administrative Science Building, Room 102; telephone 895-6024.) Transfer students are advised in this office. The College’s Office of Academic Assistance is a student’s contact point for information concerning possible majors, declaring a major, transfer credit and degree requirements.

The College’s Coordinator of Graduate Advisement, in conjunction with members of the College’s graduate faculty, is responsible for advising all management graduate students.

With certain exceptions, all College of Administrative Science undergraduate and graduate students must have their registration cards signed by the appropriate advisement personnel. Excepted from the signature requirement are undergraduate juniors and seniors who have met all of the following requirements:

1. A formal declaration of major, signed by the Coordinator of Undergraduate Advisement, the student and the faculty advisor, on file in the UAH Records Office.
2. The student must have satisfactorily completed all of the following courses:
   - English Composition EH 101-102
   - Basic Speech Communication CM 113
   - Mathematics MA 151 or MA 153
   - Library Research BIB 230
   - History HY 101-102
   - Literature
   - Fine Arts ARH 100 or 101, MU 101 or 110
   - Intro to Philosophy, Ethics, or Logic PHL 101, PHL 201, or PHL 202
   - Social Sciences (2 of 5 courses) PSC 101, 135, PY 103, SOC 100, SOC 200
   - Laboratory Sciences-Biology, Chemistry or Physics
   - Principles of Economics ECN 142-143
   - Principles of Accounting ACC 211-212
   - Accounting Lab ACC 221-222
   - Management Information Systems MIS 101, 102, 201
   - Statistical Analysis MSC 287
   - Legal Environment of Business BLS 211
3. Attained a minimum grade of “C” (2.0/4.0) average in the combined Lower Division General Education Requirements and the Lower Division Business Core Curriculum. 

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Each student is responsible for registering for all required courses in their proper sequence and for fulfilling all requirements for admission and graduation.

The focus of advising in the College of Administrative Science is to help students progress toward their educational objectives. The College’s advising system offers:

1. Transcript evaluation for transfer students and continuous monitoring of degree progress for all students.
2. Suggestions of specific courses to be selected in a given semester.
3. Program planning designed to outline an entire course of study.
4. Referral to appropriate university resources for students seeking career guidance, personal counseling or other types of assistance.

Advising is designed to provide assistance where desired and appropriate. Students, especially those nearing graduation, are encouraged to make full use of the advising system.

Types of Advising Assistance Available.

Transcript Evaluation. Two aspects of transcript evaluation affect students: (1) Evaluation of course work to be transferred to UAH for degree credit and (2) the continuing evaluation of completion of graduation requirements. The evaluation of transfer work is initially accomplished by the University’s Office of Admissions. Evaluation of business and economics course work is conducted by the College’s Coordinator of Undergraduate Advisement, Room 102, Administrative Science Building, working with various departments within the college.

The College’s Office of Academic Assistance also keeps a current record of each student’s progress at UAH.

Schedule Building. Schedule building is the determination of specific courses the student should take in a given term. Students should refer to the UAH Schedule of Courses and the Catalog in consultation with the faculty advisor or staff of the College’s Office of Academic Assistance to determine a specific course of study. Selection of specific sections and of times for courses is the student’s responsibility. The tentative schedule must be approved by an advisor.

Program Planning. Students are encouraged to outline an entire plan of study early in their academic career. This program planning activity is provided by the College’s Coordinator of Undergraduate Advisement and includes suggested model programs for each of the major fields of study offered by the College.

Counseling. Students seeking career guidance, personal counseling or other types of assistance will be directed to the appropriate University office by the staff of the College’s Office of Academic Assistance.

Where to Find Advising Assistance.

College’s Office of Academic Assistance (102 Administrative Science Building). The College’s Office of Academic Assistance is staffed to provide assistance and understanding of degree program requirements, planning an entire academic course of study, designing a course schedule for a particular semester and for providing referrals to other University offices for assistance as appropriate.

College’s Office of the Dean (202 Administrative Science Building). Students should come to the office of the dean for special advising assistance that cannot be resolved at locations described in this section and to file appeals and waiver requests relative to college and University regulations. The dean’s office will also refer students to the appropriate office should the student be unsure as to where to find assistance.

The University’s Academic Advisement and Information Center (AAIC, 118 University Center). The AAIC is available to assist first year students with their course selection.

University’s Student Records Office (116 University Center). The student records office maintains a complete and up to date file for each student admitted to the University.
Cooperative Education.
The College of Administrative Science participates in the University’s Cooperative Education Program. The program is designed to provide relevant paid employment experiences that integrate, compliment and enhance the student’s academic program. The students are placed in co-op positions in a variety of business settings, including government agencies, financial institutions, social agencies, accounting firms, entrepreneurial companies and many others. Individual academic projects are formulated in consultation with the student’s faculty advisor. Co-op placements must be approved by the student’s faculty sponsor. Participation in the co-op program requires enrollment in designated courses having prerequisites. More information is available from the business coordinator in the Co-operative Education Office.

Internship Program Guidelines
The internship program is designed to provide professional work experience for students in a field relevant to their major.

The program consists of active involvement in a project in a business enterprise, professional organization or in a government agency that has particular interest and relevance to the student. The course grade will be given on a satisfactory (S)/unsatisfactory (U) basis.

The prerequisite is senior standing and approval of the department chairperson.

In addition to making a value judgement on the merit, quality, and relevance of the proposed internship program, the chairperson will require the following academic prerequisites prior to approval:

(a) completion of all core courses (Business Policy may be excepted) and EH 300
(b) sufficient coursework in the major relevant to the project
(c) a minimum GPA of 3.0 in all courses attempted in the College
(d) completion of at least 18 hours at UAH
(e) academic load for the term of the internship must not exceed 9 hours (this includes the 3 hrs. for the internship)

An internship may be elected only once, i.e. a maximum of 3 hours toward the BSBA degree. The internship may count as an elective within the major.

The current cooperative education activity does not qualify for an internship. However, in exceptional cases, a student may be allowed to do an internship at the “Co-op” organization during the study term. The student must meet all the requirements for internship.

The procedure to be followed in obtaining an internship is as follows:

(1) The student will apply for an internship in the Office of Academic Assistance. The Undergraduate Advisor will conduct a preliminary check to ensure that the student meets the criteria for the internship. If the student is qualified, the Undergraduate Advisor schedules an appointment for the student with the chairman of the respective department.

(2) When a potential internship opportunity is identified between an organization and a qualified student, the organization is asked to provide the department chairperson a task description requiring 100-120 hours of effort over a 10-week period. At the same time, the student writes a brief (2-3 pages) proposal to the chairperson describing the potential task, the goals, plans to accomplish the task, and how the task would be beneficial to the student’s education. These two documents must reach the departmental office at least one week prior to regular registration.

(3) The chairperson reviews the documents mentioned above and informs the student if the program is approved. The chairperson’s written approval is required prior to registration.

(4) When the chairperson’s approval is received, the student registers for the course and begins work on the project under the supervisor identified in the organization’s task description.
(5) On or about the end of the 5th week, the student is required to submit a progress report to the chairperson showing accomplishments to date, how objectives are being met, any unforeseen problems, etc.

(6) Prior to the final examination week, the project supervisor sends a letter to the chairperson evaluating the student’s work regarding quality, attendance, ability to adapt to changes, ability to work with others, and any other evaluative features of the work. At the same time, the student also submits a final report to the chair explaining the experience and accomplishments as compared to the student’s initial goals, etc.

(7) The chairperson will issue a grade of satisfactory (S) or unsatisfactory (U) based on all of the above.

(8) The chairperson will see that all paperwork is submitted to the Office of Academic Assistance for inclusion in the student’s file.

Catalog Requirements and Changes

The College of Administrative Science reserves the right to modify curricula and specific courses of instruction, to alter requirements for graduation and to change the majors to be awarded at any time the College may determine. Such changes may be applicable to either prospective or currently enrolled students.

All official notices affecting the College of Administrative Science undergraduate students are posted in the College’s Office of Academic Assistance (102 Administrative Science Building). The notices officially update the University catalogs and are binding on students pursuing programs offered by the College as if published in the catalogs.

All College of Administrative Science students enter the College under all University and College policies then in effect. Each student is responsible for meeting all catalog requirements for graduation, including taking courses in the proper sequence as shown in the catalog.

Changes in course requirements are occasionally needed in order to improve the quality of the academic programs. Such changes are not retroactive on work already taken by admitted students but will apply on work yet to be taken, except that the total remaining hours required for graduation cannot be increased and the student is not required to take an added course not available prior to graduation or for which a specified prerequisite course(s) will not have been required.

Each time a student changes a major or option, a re-evaluation of all work already taken is done in terms of that particular program’s requirements. Due to rapid advancement in knowledge, a student is permitted seven years from the original date of entry to complete a four year curriculum, after which time a re-evaluation of all work previously taken may be required.

Any deviations from curricular and other College requirements must be approved in writing in advance of the deviation (for example, substitution of courses). Such changes must normally be recommended by the student’s assigned advisor and approved by the Assistant Dean.

Bachelor of Science in Business Administration

Degree Requirements

The Bachelor of Science in Business Administration degree program is a comprehensive four year program which includes a liberal arts and science foundation, a pre-business administration core curriculum, a junior-senior business administration core curriculum, major, and a choice of elective courses.

The undergraduate curriculum is divided into the lower and upper division. To prepare students for the challenges of the future, the College’s programs provide a solid foundation in the diverse academic disciplines which relate to the needs of business, industry, and government. At the undergraduate level students concentrate the first two years of study on general course
work in the humanities and fine arts, the behavioral and social sciences, the natural sciences, and mathematics. Successful completion of these courses broadens intellectual awareness and enhances the development of cultural literacy and analytical thinking. This general education component along with the pre-business administration core curriculum prepares the student for admission to upper division course work in the College of Administrative Science.

The remaining two years of course work develops the student's understanding of the diverse functions of business in the American and world-wide economy. This is accomplished by studying the essential concepts of business and administration as well as focusing on one of the major disciplines. The student may declare a major in accounting, economics, finance, management, management information systems, marketing, or procurement management (purchasing). Students enrolling in the College's programs who have already decided what major they wish to pursue may designate that major when they register. Students who are undecided what major they wish to pursue should mark management on the registration form.

Each student must meet the following degree requirements established by the University and the faculty of the College of Administrative Science to be awarded a BSBA:

1. Complete the lower division general education requirement;
2. Complete the lower division business administration core curriculum;
3. Complete the upper division general education requirement;
4. Complete the upper division business administration core curriculum;
5. Complete the courses required for the major;
6. Complete a minimum of 128 semester hours of work with a minimum of 39 semester hours in courses numbered 300 and above;
7. Attain a minimum grade point average of 2.0 (C) in all course work attempted;
8. Attain a minimum grade point average of 2.0 (C) in the Business Administration Core Curriculum (48 hours).
9. Attain a minimum grade point average of 2.0 (C) in the major. Note: ACC majors must attain a C in each course in the ACC major.
10. Complete the business policy course with a minimum grade of "C"; and
11. Comply with University and College of Administrative Science residency requirements.

Three levels of requirements must be completed in order to receive the Bachelor of Science in Business Administration degree: (1) University general education and graduation requirements, (2) College of Administrative Science core requirements, and (3) College major requirements. Students should complete these three levels of requirements in the order listed, with some overlap and duplication of courses among the three levels. The recommended sequence of courses is presented in the following sections.

Lower Division Requirements: 63 Semester Hours

Work in the first two years of study is planned in such a way as to give the student basic information in the general areas of the humanities and fine arts, communication, the social and behavioral sciences, the natural and physical sciences, and mathematics. This liberal arts and science foundation is referred to as the General Education Requirements (GER). In addition to the GER, students must complete 21 semester hours of work in the pre-business administration lower division core curriculum. Lower division requirements are as follows:

I. Lower Division General Education Requirements .................................... Semester Hours

1. Communications
   a. English Composition I & II (EH 101-102) ................................................. 6
   b. Basic Speech Communication (CM 113) .................................................... 3
   c. Bibliography of Business and Economics (BIB 230) .................................... 1
2. Mathematics*
   Survey of Elementary Calculus (MA 151**) ................................................... 3

3. Social Sciences
   Two of the following five courses:
   American Government (PSC 101), Introduction to
   Comparative Government (PSC 135), Introduction to
   Sociology (SOC 100), Introduction to Anthropology (Soc
   200), General Psychology (PY 103) .......................................................... 6

4. Humanities
   a. Origins and Development of the Contemporary ...................................... 6
      World I & II (HY 101, 102)
   b. Survey of Literature (EH 205, 206, 230, 240, or 241) ......................... 3
   c. Fine Arts ................................................................................................. 3
      Art History Survey: Ancient to Renaissance (ARH
      100), Art History Survey: Renaissance to
      Modern (ARH 101), Fundamentals or Music (MU 100),
      or Introduction to Music Listening (MU 110).
   d. Philosophy Requirement ................................................................. 3
      One of the following courses:
      Introduction to Philosophy (PHL 101), Introduction
      to Logic (PHL 201), or Introduction to Ethics (PHL 202).

5. Natural and Physical Sciences
   Laboratory Science (for example Principles of .................................... 8***
   Biology, Chemistry or Physics) .............................................................

*Each BSBA student will be given a mathematics placement level when the student enters
UAH. The placement levels and their appropriate courses are:
Remedial MA 004 (Algebra) or MA 033 (Geometry)
Level I MA 119 or MA 105
Level II MA 121 or MA 143
Level III MA 153 or MA 151

**The mathematics department recommends that students planning a curriculum not requiring training past a minimum proficiency level should choose the following track:
   MA 105 — College Algebra
   MA 143 — Finite Mathematics
   MA 151 — Survey of Elementary Calculus

Students planning to (a) emphasize quantitative methods, or (b) minor in an area requiring
at least two quarters of calculus, or (c) attend graduate school should choose the following track:
   MA 119 — Precalculus I
   MA 121 — Precalculus II
   MA 153 — Calculus I
   MA 154 — Calculus II

***Students who have completed 10 quarter hours (or 6.6 semester hours) of laboratory science will be considered to have met this requirement. Students who have completed fewer hours of laboratory science may petition the Dean of the College of Science for an assessment of equivalency.
II. Lower Division Business Administration Core Curriculum

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principles of Macroeconomics (ECN 142)</td>
<td>3</td>
</tr>
<tr>
<td>Principles of Microeconomics (ECN 143)</td>
<td>3</td>
</tr>
<tr>
<td>Introduction to Computers and Information Systems (MIS 201)*</td>
<td>3</td>
</tr>
<tr>
<td>Statistical Analysis (MSC 287)*</td>
<td>3</td>
</tr>
<tr>
<td>Social, Legal and Ethical Environment of Business (BLS 211)</td>
<td>3</td>
</tr>
<tr>
<td>Principles of Accounting I (ACC 211 with Lab ACC 221)*</td>
<td>3</td>
</tr>
<tr>
<td>Principles of Accounting II (ACC 212 with Lab ACC 222)*</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
</tr>
</tbody>
</table>

Total Lower Division Requirements ................................................. 63

*Each student must demonstrate certain computer skills by completing, waiving, or validating MIS 101 and 102.

Upper Division Requirements: 65 Semester Hours

Work in the last two years of study is planned in such a way as to build on the foundation provided by the lower division general education requirements and the lower division business administration core. The final two years completes the student’s common body of knowledge in business administration and provides the student with advanced work in a subject area (major).

Please read the College’s section, “Admission to the Upper-Division”, to determine the requirements to enroll in upper division courses (numbered 300 through 499).

II. Upper Division General Education Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategies of Business Writing (EH 300)</td>
<td>3</td>
</tr>
<tr>
<td>(Is a corequisite or prerequisite for all ADSC courses with a number greater than 301 and prerequisite for 400 level courses.)</td>
<td></td>
</tr>
<tr>
<td>Electives outside the College of Administrative Science</td>
<td>7</td>
</tr>
<tr>
<td>(These electives may be taken in the lower division)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
</tr>
</tbody>
</table>

II. Upper Division Business Administration Core Curriculum

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managerial Accounting (ACC 301)*</td>
<td>3</td>
</tr>
<tr>
<td>Principles of Financial Management (FIN 301)</td>
<td>3</td>
</tr>
<tr>
<td>Principles of Management (MGT 301)</td>
<td>3</td>
</tr>
<tr>
<td>Information Systems in Organizations (MIS 301)</td>
<td>3</td>
</tr>
<tr>
<td>Principles of Marketing (MKT 301)</td>
<td>3</td>
</tr>
<tr>
<td>Quantitative Methods in Business (MSC 325)</td>
<td>3</td>
</tr>
<tr>
<td>Production/Operations Management (MSC 385)</td>
<td>3</td>
</tr>
<tr>
<td>International Business Requirement</td>
<td>3</td>
</tr>
<tr>
<td>(ACC 450, ECN 446, FIN 454, MKT 415, MGT 450 or MSC 470)</td>
<td></td>
</tr>
<tr>
<td>Business Policy (MGT 499)</td>
<td>3</td>
</tr>
<tr>
<td>*Accounting majors take ACC 314</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
</tr>
</tbody>
</table>
III. Major (each major is described below) ................................................. 21

IV. Free electives (May be selected from any school within the University) ............ 7
    Total Upper Division ................................................................. 65
    Total Lower Division ............................................................... 63
    Total minimum hours for a BSBA Degree ...................................... 128**

**No more than six hours of HPE activity and music ensemble courses may count toward
graduation.

Majors in the BSBA Degree

Department of Accounting and Business Legal Studies

Professors Porter and Titard; Associate Professor Bryson; Assistant Professors Batchelder, Burks, Spearling, Wall and Woodward; Adjunct instructor, Swann; Lecturer, Justinger.

Admission and Academic Standard for Accounting Majors

For a student admitted as a candidate for a Bachelor of Science in Business Administration degree (BSBA) with a major in accounting or a Certificate in Accounting, admission to accounting courses numbered above ACC 301 is predicated upon admission to the Upper Division of the College of Administrative Science and an acceptable score on the Accounting Program Admission TEST (APAT). The student should contact the Testing Office in the University Center to register for the APAT the term in which the student completes ACC 212. A student admitted to the upper division accounting program is required to make a grade of at least a “C” on each accounting course to be applied toward the BSBA degree of the Certificate in Accounting.

Requirements for a major in Accounting within the BSBA degree are as follows:

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC 310</td>
<td>Intermediate Accounting I</td>
<td>3</td>
</tr>
<tr>
<td>ACC 311</td>
<td>Intermediate Accounting II</td>
<td>3</td>
</tr>
<tr>
<td>ACC 312</td>
<td>Intermediate Accounting III</td>
<td>3</td>
</tr>
<tr>
<td>ACC 313</td>
<td>Income Tax Accounting I</td>
<td>3</td>
</tr>
<tr>
<td>ACC 407</td>
<td>Accounting Information Systems</td>
<td>3</td>
</tr>
<tr>
<td>ACC 431</td>
<td>Principles of Auditing</td>
<td>3</td>
</tr>
<tr>
<td>ACC 470</td>
<td>Seminar in Contemporary Accounting Issues</td>
<td>3</td>
</tr>
</tbody>
</table>

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Students preparing for professional certification examinations, such as the Certified Public Accountant (CPA), the Certified Management Accountant (CMA), or the Certified Internal Auditor (CIA), will need course work in accounting beyond the minimum requirements for the BSBA degree. Students interested in additional information concerning preparation for one or more of the preceding examinations should contact the Chair of the Department of Accounting and Business Legal Studies (895-6159).

Department of Economics and Finance

Professors Billings, and Paul; Associate Professors Schnell, Schoening and Wilhite; Assistant Professors Forbes, Sarver and Tan.
Economics

The BSBA curriculum emphasizes the applied aspects of economic analysis and describes the principles and methods for organizing a business firm and combining resources to produce goods and services, taking account of costs, profits, and the organization of markets. The economics major is appropriate for careers in both public agencies and private firms where economic data analysis and forecasting are performed. The program also prepares for students who wish to pursue advanced degrees in business, economics, and law. Students wishing to major in economics should see the Chairman of the Department of Economics and Finance. The Economics major is offered only during the day.

Requirements for a major in Economics in the BSBA degree are as follows:

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECN 340</td>
<td>Macroeconomic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>ECN 345</td>
<td>Microeconomic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>FIN 352</td>
<td>Money and Banking</td>
<td>3</td>
</tr>
<tr>
<td>ECN 375</td>
<td>Labor Markets, Wages and Employment</td>
<td>3</td>
</tr>
<tr>
<td>ECN 440</td>
<td>Industrial Structure and Regulation</td>
<td>3</td>
</tr>
<tr>
<td>ECN 448</td>
<td>Development of Economic Theory</td>
<td>3</td>
</tr>
<tr>
<td>ECN 470</td>
<td>Seminar in Economics</td>
<td>3</td>
</tr>
</tbody>
</table>

Finance

The major in finance acquaints students with the modern analytic principles of finance and the structure and performance of financial markets and institutions. To be successful, a finance major should possess superior analytic skills and be proficient in economic analysis, algebra, elementary calculus, and statistics. The major in finance is preparatory to careers in security analysis, portfolio management, commercial, investment, mortgage banking, and corporate financial management.

The BSBA Finance major is offered only during the evening.

Requirements for a major in Finance within the BSBA degree are as follows:

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIN 352</td>
<td>Money &amp; Banking</td>
<td>3</td>
</tr>
<tr>
<td>FIN 361</td>
<td>Equity Markets</td>
<td>3</td>
</tr>
<tr>
<td>FIN 375</td>
<td>Financial Institutions</td>
<td>3</td>
</tr>
<tr>
<td>FIN 378</td>
<td>Intermediate Finance</td>
<td>3</td>
</tr>
<tr>
<td>FIN 395</td>
<td>Advanced Topics in Corporate Finance</td>
<td>3</td>
</tr>
<tr>
<td>FIN 431</td>
<td>Managerial Finance</td>
<td>3</td>
</tr>
<tr>
<td>FIN 470</td>
<td>Seminar in Finance</td>
<td>3</td>
</tr>
</tbody>
</table>

Department of Management and Marketing

Professor McCollum; Associate Professors Gramm, Jackson, Olsen, and Sherman; Assistant Professors Burger, and Padmanabhan; Instructors Adams, Simpson and Spann.

Management

A major in management enables the student to develop a better understanding of the social, political, and industrial society in which we live. Such an understanding complements the skills developed in the program which are necessary for the effective and efficient operation of a wide range of governmental, business, and industrial organizations.

This major generally describes the planning, organizing and controlling of a business, including organizational and human aspects, with emphasis on various theories of management, the knowledge and understanding necessary for managing people and functions, and decision making.
The management major is structured to provide the broad education students will need for flexibility and mobility as future managers in various possible types of organizations. This permits students to elect one of several available tracks to assist them in more adequately fulfilling requirements of their planned initial employment and to prepare students for advanced studies in their chosen fields.

There are two tracks in the management curriculum. The general business track is offered for students whose career goals require a broad knowledge of the functional areas of management rather than the specialization of a major field.

This major option would be used primarily by students planning to enter a small business where a specialization (such as accounting or marketing) is not as appropriate an educational background as is extensive upper division coursework in three or four functional areas.

The second is the Management track. This track focuses on personnel administration, organizational behavior, and labor relations.

Requirements for a major in Management within the BSBA degree are as follows:

**General Business Track:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIN 378</td>
<td>Intermediate Finance</td>
<td>3</td>
</tr>
<tr>
<td>MGT 363</td>
<td>Personnel: Human Resource Management</td>
<td>3</td>
</tr>
<tr>
<td>MGT 332</td>
<td>Consumer Behavior</td>
<td>3</td>
</tr>
<tr>
<td>MSC 386</td>
<td>Advanced Production and Operations Management</td>
<td>3</td>
</tr>
<tr>
<td>MGT 342</td>
<td>Promotional Strategy</td>
<td>3</td>
</tr>
<tr>
<td>MIS 400</td>
<td>Decision Support Systems</td>
<td>3</td>
</tr>
<tr>
<td>MGT 405</td>
<td>Small Business Management</td>
<td>3</td>
</tr>
</tbody>
</table>

**Human Resource Management Track:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGT 361</td>
<td>Organizational Behavior</td>
<td>3</td>
</tr>
<tr>
<td>MGT 362</td>
<td>Management and Labor Relations</td>
<td>3</td>
</tr>
<tr>
<td>MGT 363</td>
<td>Personnel: Human Resources Management</td>
<td>3</td>
</tr>
<tr>
<td>BLS 310</td>
<td>Labor Law</td>
<td>3</td>
</tr>
<tr>
<td>MGT 460</td>
<td>Employee Training and Development</td>
<td>3</td>
</tr>
<tr>
<td>MGT 461</td>
<td>Wage and Salary Administration</td>
<td>3</td>
</tr>
<tr>
<td>MGT 470</td>
<td>Seminar in Management</td>
<td>3</td>
</tr>
</tbody>
</table>

**Marketing**

The marketing program studies the principles, practices and concepts involved in business activities which transfer products and services from the producer to the consumer. It includes the study of consumers and their behavior in the market, the channels of distribution, promotional consideration, and other related topics. In particular, this program focuses on the marketing research activities such as analysis of data on product and sales, the conducting of surveys and interviews, test marketing of new products, and preparation of recommendations to clients or internal management. A degree in marketing prepares the student for careers with manufacturers, distributors, retailers, government, and other business operations.

Requirements for a major in Marketing within the BSBA degree are as follows:

**Course**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MKT 315</td>
<td>Sales Management and Professional Selling</td>
<td>3</td>
</tr>
<tr>
<td>MKT 332</td>
<td>Consumer Behavior</td>
<td>3</td>
</tr>
<tr>
<td>MKT 343</td>
<td>Marketing Research Design</td>
<td>3</td>
</tr>
<tr>
<td>MKT 470</td>
<td>Seminar in Marketing</td>
<td>3</td>
</tr>
<tr>
<td>MKT 480</td>
<td>Marketing Management</td>
<td>3</td>
</tr>
<tr>
<td>MGT 405</td>
<td>Small Business Management</td>
<td>3</td>
</tr>
</tbody>
</table>
*Students who take MKT 415 to satisfy the international business requirement can not use this as a marketing elective course. Additional marketing courses can be taken as College electives.

**Procurement Management (Purchasing)**

The major in procurement management, contract management and purchasing describes the methods, techniques, and processes by which contracts are obtained, monitored, and completed. It has as its primary objective the preparation of qualified students for careers in procurement management in federal, state and local government agencies as well as the private sector. In order to achieve these objectives, the program stresses a broad foundation in the essential elements of business administration, and a specialization in procurement management.

The program is designed to provide the basic skills and knowledge requirements for procurement positions (GS 1102) for positions at the GS 5-9 level of the following procurement specializations:

- Contract Negotiator/Specialist
- Cost/Price Analyst
- Contract Administrator
- Contract Terminations

As well as Contracting Officer, levels 1, 2, & 3.

Requirements for a major in Procurement Management within the BSBA degree are as follows:

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRM 301</td>
<td>Introduction to Procurement</td>
<td>3</td>
</tr>
<tr>
<td>PRM 302</td>
<td>Contract Administration</td>
<td>3</td>
</tr>
<tr>
<td>PRM 303</td>
<td>Cost and Price Analysis</td>
<td>3</td>
</tr>
<tr>
<td>PRM 404</td>
<td>Negotiation Techniques</td>
<td>3</td>
</tr>
<tr>
<td>PRM 405</td>
<td>Government Contract Law</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>College of Administrative Science electives approved by advisor:</td>
<td>6</td>
</tr>
</tbody>
</table>

The faculty recommends that procurement College of Administrative Sciences electives be chosen from the following courses:

- ACC 314 Cost Accounting
- ACC 407 Accounting Information Systems
- MGT 361 Organizational Behavior
- MSC 386 Advanced Production/Operations Management
- MSC 401 Production Planning and Control
- MSC 402 Materials Management
- MKT 343 Marketing Research Design

The faculty recommends that any available free electives be chosen from the following courses:

- CM 310 Persuasion
- CM 350 Organizational Communication
- PSC 350 Public Administration
- ISE 321 Engineering Economy
- ISE 378 Materials and Manufacturing Processes

This major helps students prepare for the Office of Personnel Management (OPM) competitive examination for positions in the field of government contracting, particularly Contract Specialist, GS-5/7. Students preparing for professional certification examinations, Certified Associate Contracts Manager (CACM) and Certified Professional Contracts Manager (CPCM)
will need to complete one or two years of relevant work experience, respectively, and educational requirements beyond the minimum requirements for the BSBA degree. Students interested in additional information concerning preparing for one or more of these examinations should contact the chair of the Department of Management and Marketing (895-6680).

**Department of Management Information Systems and Management Science**

Professors Souder (Eminent Scholar), Stafford, and Zant; Research Professor Schroer; Associate Professor Tseng; Assistant Professors, Floyd, Richards, and Riggs; Adjunct Assistant Professor Ballenger, Adjunct Instructors Johnson, Judkins and Maddux; Lecturer J. Forbes, Wilson.

**Management Information Systems**

The major in management information systems is designed for students who want to become designers of information systems that utilize computers in a business or administrative environment. Management information systems subject matter includes computer hardware, computer software, systems analysis and design methodologies, behavioral issues and the business or administrative context within which computer systems are applied. The Management Information Systems curriculum differs from the Computer Science curriculum a number of ways:

a. The management information systems curriculum covers information system concepts and processes within the contexts of organization functions, management activity and technical information systems knowledge, whereas computer science tends to be taught within an environment of mathematics, algorithms, and engineering technology.

b. The management information systems graduate is expected to work within the environment of an organization and to interact with both organizational functions and computer technology. The computer science graduate has less interaction with organizational functions and more interaction with hardware and software technology.

c. In technical expertise, the management information systems curriculum places a substantial emphasis on analysis and design methodologies appropriate to the business and administrative environment. The computer science graduate typically has less exposure to management information requirements analysis and organizational considerations but obtains greater expertise in algorithm development, and computer hardware.

Requirements for a major in Management Information Systems within the BSBA degree are as follows:

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIS 210</td>
<td>Introduction to Computer Programming in Business</td>
<td>3</td>
</tr>
<tr>
<td>MIS 340</td>
<td>Data Bases for Management</td>
<td>3</td>
</tr>
<tr>
<td>MIS 412</td>
<td>Information System Design</td>
<td>3</td>
</tr>
<tr>
<td>MIS 475</td>
<td>Information Resource Management</td>
<td>3</td>
</tr>
<tr>
<td>MIS 499</td>
<td>Systems Development Project</td>
<td>3</td>
</tr>
<tr>
<td>Plus three hours from the following:</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>MIS 310</td>
<td>Advanced Computer Programming in Business</td>
<td>3</td>
</tr>
<tr>
<td>MIS 350</td>
<td>Advanced Data Bases for Management</td>
<td>3</td>
</tr>
<tr>
<td>Plus three hours from the following:</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>MIS 400</td>
<td>Decision Support Systems</td>
<td>3</td>
</tr>
<tr>
<td>MIS 460</td>
<td>Seminar in Telecommunications &amp; Distributed Processing</td>
<td>3</td>
</tr>
<tr>
<td>MIS 480</td>
<td>Seminar in Management Information Systems</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Hours Within Major ABOVE CORE REQUIREMENTS 21
Possible Minors for the BSBA Degree

BSBA degree candidates may supplement their degree program by choosing a minor. Students electing a minor may use the 14 hours of electives and courses completed in the general education requirements as part of the required 21 hours. However, students who choose a minor may be required to complete more than 128 hours. Courses counted in a minor may not be applied to core or major course requirements for a BSBA degree. Check with the College's Coordinator of Undergraduate Advisement (Room 102, Administrative Science Building).

Certificate In Accounting

Many individuals express a desire to pursue a career in accounting after having earned a bachelor's degree in another discipline. In order to sit for the Uniform Certified Public Accountant (CPA) Examination in Alabama and many other states, the Certified Management Accountant (CMA) examination, or the Certified Internal Auditor (CIA) examination, a person must have a bachelor's degree (not necessarily in accounting) and as many credit hours in accounting as the student would have if he/she had majored in accounting. In order to meet this need, UAH offers a Certificate in Accounting program.

Admission to the Certificate in Accounting program is limited to students having a bachelor's degree in a discipline other than accounting. In addition, a student is required to complete the Pre-Business Administration Core Curriculum, specific course prerequisites, and attain an acceptable score on the Accounting Program Admission Test (APAT). The student should contact the Testing Office in the University Center to register for the APAT the term in which the student completes ACC 212. After admission to the program the student may enroll in the following courses:

<table>
<thead>
<tr>
<th>Course Number and Title</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC 310 Intermediate Accounting I</td>
<td>3</td>
</tr>
<tr>
<td>ACC 311 Intermediate Accounting II</td>
<td>3</td>
</tr>
<tr>
<td>ACC 312 Intermediate Accounting III</td>
<td>3</td>
</tr>
<tr>
<td>ACC 313 Income Tax Accounting I</td>
<td>3</td>
</tr>
<tr>
<td>ACC 314 Cost Accounting</td>
<td>3</td>
</tr>
<tr>
<td>ACC 407 Accounting Information Systems</td>
<td>3</td>
</tr>
<tr>
<td>ACC 431 Principles of Auditing</td>
<td>3</td>
</tr>
<tr>
<td>ACC 470 Seminar in Contemporary Accounting Issues</td>
<td>3</td>
</tr>
</tbody>
</table>

The student must counsel with the Coordinator of Undergraduate Advisement, secure the approval of the Chair of the Department of Accounting and Business Legal Studies, and be admitted to UAH as a regular student before enrolling in the Certificate in Accounting program. A student may transfer credit to apply toward the Pre-Business Administration Core Curriculum, prerequisite requirements, and a maximum of six (6) semester hours in accounting toward the program itself. A student admitted to the certificate program is required to make a grade of at least a "C" on each accounting course to be applied toward the Certificate in Accounting.

Bachelor of Arts in Economics Degree Requirements

The College of Administrative Science offers the BA in economics degree. This curriculum emphasizes the liberal arts aspects of economic study providing the student with a greater appreciation and understanding of the economic, cultural, and political environment of our society. This avenue of study is especially useful to students interested in pursuing graduate study in economics or other related academic fields. The BA degree in economics is also an excellent preparation for students planning careers in business, law, the foreign service or other related professions.

For more information see the section of the catalog concerning requirements for the BA degree.
I. General Education Requirements for B.A. Degree in Economics

English Composition (EH 101 and EH 102) Students in the Honors Program may substitute EH 105H .................................................. 6

Survey of Literature: EH 205-206 or EH 205-241 or 
EH 205-230 or EH 206-240 or EH 230-240 or 
EH 250-251. Students in Education must choose EH 205-230 ......................... 6

Foreign Languages: Two courses at the 200-level (or placement 
at that level): French, German, Japanese, Latin, Russian, Spanish ...................... 6

Fine Arts: One course chosen from ARH 100, ARH 101, ARS 110, 
MU 100, MU 110, CM 122 ................................................................. 3

Lower level humanities course. PHL 101 or a 200 level course in 
English, History, or Philosophy (Excluding PHL 201), 
outside the major and minor except for those students completing 
all requirements for teacher certification .............................................. 3

Upper level Humanities or Fine Arts* One course chosen from 
English (excluding EH 300, 301, or 302), History, Music, 
Philosophy, Art, Foreign Language literature courses, or 
Communications 309 or 322, outside the major and minor 
except for students completing all requirements for teacher certification............. 3

Mathematics: One course at Level II or above ...................................... 3

Science: Two courses in a single discipline and one course in a 
second laboratory science chosen from Astronomy, 
Biological Sciences, Chemistry, Environmental Science, or Physics .................. 12

Social Sciences. Four courses chosen from PSC 101, PSC 135, SOC 100, SOC 
200, PY 103, ECN 142, ECN 143. May be included in the major 
and minor. Students completing all requirements for teacher certification 
may substitute ED 230 and ED 263 for any two of these courses except 
one economics course which is required for education students....................... 12

Upper-level Social Sciences* One course chosen from Political 
Science, Psychology, Sociology, Economics, outside the 
major and minor except for students completing all requirements 
for teacher certification ........................................................................... 3

Additional Requirements. One course chosen from MA 151 or above, 
PHL 201, ST 281, AHS 300, CS 100, or CS 108. Students who 
complete all requirements for teacher certification may substitute 
ED 360 or ED 510 .................................................................................. 3

*Students in the Honors Program may substitute H399

95
### Major Requirements for the BA Degree in Economics

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECN 142</td>
<td>Principles of Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>ECN 143</td>
<td>Principles of Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>MSC 287</td>
<td>Introduction to Business Statistics</td>
<td>3</td>
</tr>
<tr>
<td>ECN 340</td>
<td>Macroeconomic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>ECN 345</td>
<td>Microeconomic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>ECN 352</td>
<td>Money and Banking</td>
<td>3</td>
</tr>
<tr>
<td>ECN 375</td>
<td>Labor Markets, Wages, and Employment</td>
<td>3</td>
</tr>
<tr>
<td>ECN 440</td>
<td>Industrial Structure and Regulation</td>
<td>3</td>
</tr>
<tr>
<td>ECN 448</td>
<td>Development of Economic Theory</td>
<td>3</td>
</tr>
<tr>
<td>ECN 470</td>
<td>Seminar in Economics</td>
<td>-1</td>
</tr>
<tr>
<td></td>
<td>(Total)</td>
<td>30</td>
</tr>
</tbody>
</table>

### Minor Requirements

- A minimum of 18 semester hours in a single discipline with a minimum of 12 hours at the 300 level or above. 
  - 18-21

In lieu of a minor, students may choose a minimum of 21 semester hours in cognate studies drawn from two closely related disciplines. A minimum of 12 hours must be 300 level or above. Cognate studies must be approved by the major department.

### Electives

- The student may select any elective courses outside of the major and minor as needed to complete the University requirement of a minimum of 128 hours for graduation. A minimum of 39 hours of course work in the program of study must be upper level.

### Minimum Degree Requirements

- 128

For more information please contact the Chairman of the Department of Economics and Finance.

### Master of Science in Management

#### Purpose of the MSM

The Master of Science in Management (MSM) degree is a unique specialized management program, especially designed for the management of technology including the special needs of the Huntsville community. It provides entry-level and mid-career managers with the practical and theoretical knowledge necessary to manage public and private organizations. The program builds capable, creative managers able to face successfully both external challenges such as rapid technological change, and increasing environmental complexities, and internal issues such as changing employee expectations, and methods of increasing productivity. The program recognizes the influence of computer technology on all management processes by thoroughly integrating micro and mainframe computer applications into coursework. It increases skills in information management through the use of computerized classrooms, laboratories and computer-assisted instruction.

The total hours required of students and the level at which they begin participation in the MSM program depends on their academic preparation. Generally, the program extends for two years for full-time students with a nonbusiness administration background, and one year for full-time students with a business administration background. The total number of hours re-
quired for completion of an MSM may range from 33 to 63.

All of the 600 level courses are offered in the evening.

Goals of the MSM program are met through an interdisciplinary curriculum which develops skills in applying advanced technology and behavioral concepts crucial to management. This curriculum supplies students with critical knowledge about a wide range of organizations through coursework in accounting, economics, finance, management, quantitative methods, marketing, management information systems, the worldwide dimension of management of organizations, and the legal-social-political-ethical environment of organizations. This Foundation Curriculum allows students without the prerequisite undergraduate preparation to acquire the common body of knowledge in management.

The Core Curriculum then builds on this foundation through advanced study in the quantitative and human aspects of organizational problem-solving, including the communication, interpersonal, and negotiation skills indispensable to effective management.

These management skills are enhanced further by a study in depth in one of the following options:
- Accounting
- Management
- Management Information Systems
- Project Management

Students may follow one of the two plans for the program of study: Plan I requires the presentation of a thesis; Plan II does not.

Admission Requirements

Admission to the MSM program is granted to students who show high promise of success in postgraduate management study and who hold baccalaureate degrees from regionally accredited institutions. Individuals with baccalaureate degrees in any field of study are eligible to apply to the MSM program.

Students may have backgrounds in such diverse fields as engineering, liberal arts, education, science, and nursing. Admission to the program is competitive. It is based on an applicant's undergraduate academic performance, and scores on the Graduate Management Admission Test (GMAT). Scores on the Test of English as a Foreign Language (TOEFL) are also required for international applicants.

Applicants may arrange to take the GMAT by making application to: Graduate Management Admission Test, Educational Testing Service, P.O. Box 966, Princeton, N.J. 08540. Applications to take the GMAT may be obtained from the University's Testing Service in the University Center. In making application, request that a copy of the test score be sent to the College of Administrative Science, The University of Alabama in Huntsville, Huntsville, AL 35899.

Once an applicant has submitted documents to satisfy all the above requirements, the applicant's file will be reviewed by a faculty committee. Applicants may be allowed to begin graduate study in one of the following two categories:
1. Unconditional Admission

Applicants will be considered for unconditional admission if they obtain a total of at least 950 based on the formula: 200 times the overall undergraduate grade point average (based on a 4.0 scale) plus the GMAT total score.

2. Conditional Admission

Applicants not meeting the above criteria may be considered for conditional admission. Recommendation for conditional admission is based on the applicant's prior academic performance, GMAT scores, relevant work experience, and any additional information the applicant
may wish to submit. Students admitted conditionally must maintain a “B” average for the first twelve hours of graduate work and meet any other conditions established.

Policies
Advisement and Registration Procedures
Advisement of graduate students is handled by the College’s Graduate Coordinator. Students must file a Program of Study outlining their degree program, including choice of electives, before they have completed 12 hours of graduate work.
During each registration period, all registration cards must be approved by the College’s Graduate Coordinator.
All students are encouraged to pre-register for classes during the early registration period seven weeks prior to the term. (See the UAH Calendar.)

Course Load
The usual course load for a full-time graduate student in management is six-nine semester hours per term. The maximum load is ten semester hours. Students who are employed full time must obtain permission of the advisor to enroll in more than three semester hours per term.

Transfer Credit
Courses taken at the graduate level which are transferred to meet the Foundation Curriculum are excluded from the UAH policy on the maximum number of hours permitted to be transferred. Please refer to the Graduate School requirements.

Degree Requirements
Advanced Standing: Students with strong backgrounds in mathematics and business administration may be granted advanced standing in the MSM program through equivalent credit for “common body of knowledge” Foundation courses for which a minimum grade of C was received in an undergraduate program. Most students entitled to such credit hold baccalaureate degrees in business administration from accredited institutions. Students may be granted equivalent credit for any or all of the Foundation courses, depending on the depth of their undergraduate or previous graduate preparation. The MSM program may consist of as few as 33 hours for students who receive equivalent credit for all of the Foundation courses.

Students Not Receiving Advanced Standing: Students with baccalaureate degrees in non-business fields may not have enough background to warrant advanced standing except for work in economics, mathematics, and/or statistics. Determination regarding equivalency credit will be made by the Coordinator of Graduate Advisement following admission to the program.
In addition to meeting all degree requirements established by the School of Graduate Studies, all candidates for a Master of Science in Management degree must meet the conditions of one of the following two plans to be eligible for graduation:

Plan I — MSM thesis option:
1. Completion of the Foundation of Management Curriculum;
2. Completion of 33 semester hours (beyond the foundation) of an approved program;
3. Completion of the Management Core Curriculum;
4. Completion of an option including six hours of thesis;
5. A minimum “B” average for all degree credit coursework
7. Successful completion of the final comprehensive examination on the coursework and thesis.

Plan II—MSM non-thesis option:
1. Completion of the Foundation of Management Curriculum;
2. Completion of 33 semester hours (beyond the foundation) of an approved program;
3. Completion of the Management Core Curriculum;
4. Completion of an option of nine hours;
5. A minimum "B" average for all degree credit coursework
6. Successful completion of the final comprehensive examination on the coursework.

Foundation of Management Curriculum (30 semester hours)
The Foundation Curriculum gives students the necessary background to enter the Management Core Curriculum. With the approval of the Coordinator of Graduate Advisement, students who have completed equivalent coursework prior to entering the MSM Program may be permitted to waive the foundation coursework. The foundation courses are:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA 151</td>
<td>Elementary Calculus</td>
<td>3</td>
</tr>
<tr>
<td>MSC 287</td>
<td>Statistical Analysis</td>
<td>3</td>
</tr>
<tr>
<td>ACC 601</td>
<td>Introduction to Accounting</td>
<td>3</td>
</tr>
<tr>
<td>BLS 211</td>
<td>Environment of Business</td>
<td>3</td>
</tr>
<tr>
<td>ECN 239</td>
<td>Principles of Economics</td>
<td>3</td>
</tr>
<tr>
<td>FIN 301</td>
<td>Principles of Financial Management</td>
<td>3</td>
</tr>
<tr>
<td>MGT 301</td>
<td>Principles of Management</td>
<td>3</td>
</tr>
<tr>
<td>MIS 301</td>
<td>Information Systems in Organizations</td>
<td>3</td>
</tr>
<tr>
<td>MKT 301</td>
<td>Principles of Marketing</td>
<td>3</td>
</tr>
<tr>
<td>4XX</td>
<td>International Business Requirement</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>(ACC 450, FIN 454, MGT 450, MKT 415 or MSC 470)</td>
<td>30</td>
</tr>
</tbody>
</table>

Management Core Curriculum (24 Semester hours)
The Management Core Curriculum provides students with a comprehensive understanding of effective management in public and private organizations. Emphasis is placed on the managerial aspects of complex organizations and their human elements. The core focuses on the management of technology. The Management Core Curriculum consists of the following courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGT 622</td>
<td>Human Behavior in Organizations</td>
<td>3</td>
</tr>
<tr>
<td>MGT 623</td>
<td>Organizational Theory</td>
<td>3</td>
</tr>
<tr>
<td>ACC 602</td>
<td>Managerial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>MSC 642</td>
<td>Management Science for Project Management</td>
<td>3</td>
</tr>
<tr>
<td>MSC 651</td>
<td>Production/Operations Management</td>
<td>3</td>
</tr>
<tr>
<td>MIS 634</td>
<td>Seminar in Management Information Systems</td>
<td>3</td>
</tr>
<tr>
<td>MSC 690</td>
<td>Management of Technology</td>
<td>3</td>
</tr>
<tr>
<td>MGT 698</td>
<td>Strategic Management</td>
<td>3</td>
</tr>
</tbody>
</table>

30 24
Strategic Management Requirement

While the entire MSM program is concerned with the development of managers, the Strategic Management requirement emphasizes the top management perspective. Strategic Management, MGT 698, serves as the final integrating course for the MSM program. Students will examine administrative processes under conditions of uncertainty, including such topics as integrating analysis and policy determination at the overall management level. It includes analysis of changing environments, organizational strategy development, strategic goal setting, organizational policy formulation, and management problem analysis. MGT 698 must be completed with a minimum grade of B.

Option Curriculum (9 semester hours)

The curriculum leading to the Master of Science in Management degree is an interdisciplinary program. In order for each student to acquire depth in a discipline, each student must complete a minimum of nine semester hours in a selected discipline. The student’s selection of the nine hours in the discipline must be approved by the Department chairperson. The options are accounting, management, management information systems and project management. Under Plan I the student completes the option’s required 600 level course plus six semester hours of master’s thesis (MGT 699, MIS 699, or MSC 699). Under Plan II the student completes the option’s required 600 level course and selects six semester hours of 500 level courses in a discipline.

With the approval of the Department Chairperson of the student’s option, the student may be permitted to select three hours of 500 level international business coursework as part of the option provided: 1) the course selected is within the option’s discipline, and 2) the student does not have an undergraduate international course in the same discipline. The 500 level international business course used in the option may also be used to satisfy the foundation curriculum’s international business requirement.

1. Accounting Option:

This option provides advance instruction in the concepts and procedures underlying recording, processing, and reporting financial information useful in the management of organizations. Students are required to complete the following coursework:

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC 614 Advanced Managerial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>Six hours from 500 level Accounting &amp; Business Legal Studies courses*</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
</tr>
</tbody>
</table>

*The student must meet all course prerequisites in order to enroll.

2. Management Option:

This option is oriented toward general management with a specific focus in the area of the management of technology and project management.

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGT 570 Seminar in Management</td>
<td>3</td>
</tr>
<tr>
<td>MGT 640 Principles of Project Management</td>
<td>3</td>
</tr>
<tr>
<td>Three hours from 500 level management courses*</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
</tr>
</tbody>
</table>

*The student must meet all course prerequisites in order to enroll.
3. Management Information Systems Option:
This option is for students seeking additional technical expertise in computer based information systems as well as in the application of computer technology to management systems. It involves the application of advanced computer technology to the business/management environment.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIS 500</td>
<td>Decision Support Systems*</td>
<td>3</td>
</tr>
<tr>
<td>MIS 560</td>
<td>Seminar in Telecommunications and Distributed Processing*</td>
<td>3</td>
</tr>
<tr>
<td>MIS 670</td>
<td>Information Systems Analysis and Design</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>9</td>
</tr>
</tbody>
</table>

*The student must meet all course prerequisites in order to enroll.

4. Project Management Option:
This option examines the process whereby a single manager is responsible for planning, organizing, coordinating, directing, and controlling the combined effort of contractors and participating organizations in accomplishing program/project objectives. This process is employed throughout the acquisition life cycle to ensure that efforts of functional activities of the organizations are consistent with program objectives and that participating organizations act with full awareness of their respective functions and responsibilities. It includes major systems as well as small systems, subsystems, and equipment. The primary differences between major acquisitions and small projects are related to systems integration, degree of complexity, procedures, and the levels of review and approval.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSC 641</td>
<td>Project Management Planning and Control</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Six hours from:</td>
<td></td>
</tr>
<tr>
<td>MSC 500</td>
<td>Decision Support Systems and Expert Systems*</td>
<td></td>
</tr>
<tr>
<td>MSC 570</td>
<td>International Production Management**</td>
<td></td>
</tr>
<tr>
<td>MSC 586</td>
<td>Advanced Production Operations Management*</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>9</td>
</tr>
</tbody>
</table>

*The student must meet all course prerequisites in order to enroll.  
**May be taken only if the student does not have an undergraduate international course in this discipline.

Ph.D. in Business Administration
The Ph.D. in Business Administration may be obtained through co-operative study with the University of Alabama, Tuscaloosa. The Ph.D. requirements of the Graduate School and the College of Commerce and Business Administration at UA must be fulfilled. Please consult the UA graduate catalog.

The Doctor of Philosophy degree is a research-oriented degree awarded upon the demonstration of scholarly attainment. The program is designed principally for those who wish to prepare for college and university teaching and research or for the management of organizations.

Admission Requirements
Admission to the doctoral program is open to qualified individuals who hold undergraduate and/or graduate degrees from accredited colleges and universities. Individuals seeking admission to the doctoral program should request information on application procedures by contacting UAH's Coordinator of Graduate Advisement for the College of Administrative Science at 205 895-6024. Applications for admission are carefully evaluated by the faculty of UAH's Graduate School of Management and UA's Graduate School of Business.
Student’s Program Committee

A committee is established for each student. The Program Committee guides the student in the selection of courses and counsels the student regarding other aspects of the program.

The chairman and a majority of committee members are from the University of Alabama in Tuscaloosa campus. The program committee ceases to exist when the student passes the preliminary oral examination.

Degree Requirements

The degree requirements for the cooperative Ph.D. program in Business Administration have been jointly established by the graduate faculties of the University of Alabama, Tuscaloosa, School of Commerce and Business and UAH’s College of Administrative Science. Requirements of both graduate schools must be fulfilled. Consult UA’s Graduate Catalog for full degree requirements.

The following considerations are made for UAH cooperative Ph.D. students:

Courses at UAH. Coursework to meet language/research tool requirements, and quantitative methods requirements may be completed at UAH. Consult UA’s Graduate Catalog for details on these requirements.

Courses at UA. The economics requirement and major and minor field coursework must be completed in residence at the University of Alabama in Tuscaloosa. This will require more than 18 credit hours at UA. Major fields are accountancy, economics, finance, industrial relations, management science, marketing, organizational behavior, production management, statistics, and transportation.

Written and Preliminary Oral Examinations. The student is required to pass a written comprehensive examination in the major field and in the minor field(s). A preliminary oral examination is given after the student has completed two years of graduate study (including work on the Master’s Degree, if any), and after the language/research tool requirement has been satisfied. The student’s Program Committee administers and conducts the preliminary oral examination.

Student’s Dissertation Committee and Dissertation Requirements. When the student is prepared to present a dissertation proposal, the Dissertation Committee is appointed by the UA department head in the student’s major field in consultation with the faculty and the student. The dissertation committee is responsible for admission of the student to candidacy, supervision of the dissertation, and administration of the final oral examination.

A dissertation showing power of independent research and literary skill must be prepared on a topic in the major field. The subject of the dissertation must be approved by the student’s dissertation committee. Consult the UA Graduate Catalog for additional information.

Student Transfer. The transfer of credit to meet degree requirements for the cooperative Ph.D. program depends upon the program of each student. For detailed information contact the Coordinator of Graduate Advisement, College of Administrative Science at (205) 895-6024.
Courses of Instruction, Admission, and Descriptions

Lower Division. Courses numbered 100 to 199 are designed primarily for freshmen and courses numbered 200 to 299 are designed primarily for sophomores. Students from other classes may be admitted for lower division credit. Graduate students may take these courses and receive lower division credit, but not graduate credit.

Upper Division. Courses numbered 300 to 499 are available only to juniors, seniors and graduate students. All students, both those admitted as majors in the College of Administrative Science and those admitted as majors in other Colleges in the University, must meet College of Administrative Science general prerequisite requirements in order to be admitted to upper division College of Administrative Science courses in addition to the specific course prerequisites cited in the course descriptions.

General prerequisites for all upper division College of Administrative Science courses are the completion of English 101 and 102, upper division standing (completion of at least 60 semester hours) and admission to UAH as a regular student. See NOTE at end of this section.

Graduate students may take these courses for upper division credit, but not for graduate credit.

Graduate Division. Only students admitted to the graduate school may enroll for courses numbered 500 to 599. Baccalaureate candidates may register for a dual course number in the 400 to 499 series. Graduate students register for the course in the 500 to 599 series. Additional work will be required of the graduate student registered in the 500 level course: to bring the course up to graduate level.

Courses numbered 600 to 699 are designed for graduate students only. Students may not be admitted to these courses unless they have been admitted to the graduate school.

Offerings. The following abbreviations indicate the terms of the calendar the course normally will be offered: Su — Summer Term, F — Fall Term, W — Winter Term, and Sp — Spring Term. Where courses are offered on alternate years only, the words “even” or “odd” will indicate which years the course will be offered. Course offerings by term are subject to change dependent upon availability of faculty resources and to accommodate the needs of students.

NOTE: Any faculty member teaching an upper-division course in the College of Administrative Science may assume that all students have completed the specific courses listed under “Lower Division Requirements” above; and for courses with a number greater than 301, will have completed EH 300.

Accounting (ACC)

Lower Division Courses

211 Principles of Accounting I 3 hrs.
Introduction to the accounting process, based upon the theory of double-entry bookkeeping. Particular emphasis upon the creation, content, and analysis of basic financial statements. Prerequisite: sophomore standing. Parallel: ACC 221. Su, F, W, Sp.

212 Principles of Accounting II 3 hrs.

213 Individual Income Tax Return Preparation 3 hrs.
A study of basic income tax law and procedures needed to prepare individual federal and state income tax returns. Prerequisite: Students enrolled at UAH not majoring in Accounting.

221 Accounting Lab I 0 hrs.
Accounting Lab II


Fundamentals of Accounting

A one-quarter course in accounting for students in fields other than administrative science who aspire to managerial positions which require an understanding of accounting. The course provides such students with an introduction to accounting terminology, to construction of accounting reports, and to the pervasive use of accounting information in business. This course may not be used as credit toward a BSBA degree. Prerequisites: sophomore standing and MSC 287. Parallel: ACC 221. Lab fee: Level 4.

Upper Division Courses (see prerequisites for Upper Division)

Managerial Accounting


Intermediate Accounting I


Intermediate Accounting II

Continued in-depth theoretical and practical treatment of selected accounting topics covering assets, liabilities, and stockholders’ equity. Emphasis is placed upon the unique accounting characteristics of corporations. Prerequisite: ACC 310. Lab fee: Level 3. F, W, Sp.

Intermediate Accounting III


Income Tax Accounting I

Determination of taxable income, business and nonbusiness deductions, and selected aspects of tax accounting for individuals and sole proprietorships. Prerequisite: ACC 212. Lab fee: Level 3. Su, W.

Cost Accounting

Review of basic cost accounting concepts. Detailed study of advanced topics relating to job order and process costing systems, standard costing, and cost-volume-profit analysis, with special attention given to behavioral implications and ethical considerations of cost accounting, as well as international business. Prerequisite: ACC 212. Lab fee: level 3. F, Sp.

Accounting Information Systems

Design, operation, and analysis of accounting information systems with respect to data input, processing, storage, recall, security, internal control, and the audit trail. Emphasis is on computer oriented systems. Prerequisites: ACC 212, MIS 301. (Same as MIS 407) Lab fee: level 4. Su, F, W, Sp.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>413</td>
<td>Income Tax Accounting II</td>
<td>3 hrs</td>
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<tr>
<td>415</td>
<td>Advanced Financial Accounting</td>
<td>3 hrs</td>
</tr>
<tr>
<td></td>
<td>Analysis of issues and alternatives in advanced problem areas including partnerships, business combinations, and not-for-profit organizations. Prerequisite: ACC 312. Lab fee: Level 3. Su.</td>
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<tr>
<td>431</td>
<td>Principles of Auditing</td>
<td>3 hrs</td>
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<tr>
<td></td>
<td>Conceptual foundations of auditing practice. Basic auditing concepts including professional ethics, legal liability, independence, and competence. Auditing of computer-oriented systems, audit sampling, and standards of reporting. Role of the internal and independent auditor. Prerequisites: ACC 312, MSC 287, and senior standing. Lab fee: Level 3. Su, W.</td>
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</tr>
<tr>
<td>432</td>
<td>Advanced Auditing</td>
<td>3 hrs</td>
</tr>
<tr>
<td></td>
<td>Practical application of auditing concepts and standards. An understanding of auditing principles is reinforced and expanded by exposure to problems and cases. Prerequisite: ACC 431. Lab fee: Level 3. F.</td>
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</tr>
<tr>
<td>450</td>
<td>Seminar in International Accounting</td>
<td>3 hrs</td>
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<tr>
<td></td>
<td>Seminar on current topics in international accounting. Prerequisite: ACC 312. (Same as ACC 550)</td>
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</tr>
<tr>
<td>470</td>
<td>Seminar in Contemporary Accounting Issues</td>
<td>3 hrs</td>
</tr>
<tr>
<td></td>
<td>Seminar on current topics in professional accounting. Prerequisite: ACC 431 and senior standing. F, Sp.</td>
<td></td>
</tr>
<tr>
<td>490</td>
<td>Special Projects</td>
<td>3 hrs</td>
</tr>
<tr>
<td></td>
<td>Independent study in an area of interest to the student in the fields of accounting. Prerequisites: senior standing and approval of the Department Chair.</td>
<td></td>
</tr>
<tr>
<td>495</td>
<td>Internship in Accounting</td>
<td>3 hrs</td>
</tr>
<tr>
<td></td>
<td>Active involvement in a project in a business enterprise, professional organization, or government agency that has particular interest and relevance to the student. Prerequisites: senior standing and approval of the Department Chair. Course grade will be given on a satisfactory (S)/unsatisfactory (U) basis.</td>
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</table>

**Graduate Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>507</td>
<td>Accounting Information Systems</td>
<td>3 hrs</td>
</tr>
<tr>
<td></td>
<td>Design, operation, and analysis of accounting information systems with respect to data input, processing, storage, recall, security, internal control, and the audit trail. Emphasis is on computer-oriented systems. Prerequisites: ACC 212, MIS 301. Lab Fee: Level 4. (Same as MIS 507). Su, F, W, Sp.</td>
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</tr>
<tr>
<td>513</td>
<td>Income Tax Accounting II</td>
<td>3 hrs</td>
</tr>
<tr>
<td></td>
<td>Tax accounting for partnerships, corporations, Sub chapter S corporations, estates, and trusts. Tax administration and research are emphasized. Prerequisite: ACC 313. Lab Fee: Level 3. Sp.</td>
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</tr>
<tr>
<td>515</td>
<td>Advanced Financial Accounting</td>
<td>3 hrs</td>
</tr>
<tr>
<td></td>
<td>Analysis of issues and alternatives in advanced problem areas including partnerships, business combinations, and not-for-profit organizations. Prerequisite: ACC 312. Lab Fee: Level 3. Su.</td>
<td></td>
</tr>
<tr>
<td>532</td>
<td>Advanced Auditing</td>
<td>3 hrs</td>
</tr>
<tr>
<td></td>
<td>Practical application of auditing concepts and standards. An understanding of auditing principles is reinforced and expanded by exposure to problems and cases. Prerequisite: ACC 431. Lab Fee: Level 3. F.</td>
<td></td>
</tr>
</tbody>
</table>
570 Seminar in Contemporary Accounting Issues
Seminar on current topics in professional accounting. Prerequisite: ACC 431 and graduate standing. F, Sp.

501 Foundations in Accounting for Management
An accelerated course in accounting fundamentals and business applications for students with non-business undergraduate degrees. The course provides such students with an introduction to accounting terminology, to construction of accounting reports, and to the use of accounting as a management tool. Prerequisite: Graduate standing.
Lab Fee: Level 3. W, Su.

602 Managerial Accounting
The course examines the managerial uses of accounting information but is primarily non-technical. The focus of the course is on the MSM students' gaining a comprehensive understanding of accounting concepts and the accepted methods of applying these concepts in decision-making, planning, and control. Prerequisites: ACC 601 and graduate standing. Lab Fee: Level 3. F, Sp.

607 Advanced Accounting Information Systems
An in-depth examination of accounting information systems. Emphasis is placed on computer-oriented systems and current developments in systems. Prerequisites: ACC 407 or 507 and graduate standing. Lab Fee: Level 4. F.

614 Advanced Managerial Accounting
Examination of the framework underlying managerial accounting and description of how accounting information should be used to fulfill planning, control, and performance evaluation functions. The focus of the course is on understanding and utilizing advanced managerial accounting concepts, practices, and techniques. Prerequisite: ACC 314 and graduate standing. Lab Fee: Level 3. Su, W.

642 Advanced Internal and Operational Auditing
Introduction to the methodology of internal and operational auditing and to the utilization of the results of the audit by management in decision making. Prerequisites: ACC 431 and graduate standing. Lab Fee: Level 3. Sp.

Business Legal Studies (BLS)
Lower Division Courses

211 Legal Environment of Business
A study of the legal environment of business including ethical, social, and political influences on both profit and non-profit organizations. Su, F, W, Sp.

Upper Division Courses (see prerequisites for Upper Division)

310 Labor Law
Analysis of background, content, and significance of labor relations law. Prerequisites: BLS 211, MGT 301. Sp.

411 Business Law for Accountants
An in-depth study of legal principles and problems encountered in practice by professional accountants. This course covers legal topics from a Uniform Commercial Code perspective. Prerequisites: BLS 211 and senior standing.

Graduate Courses

511 Business Law for Accountants
An in-depth study of legal principles and problems encountered in practice by professional accountants. This course covers legal topics from a Uniform Commercial Code perspective. Prerequisite: BLS 211. W
### Economics (ECN)

#### Lower Division Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>142</td>
<td>Principles of Macroeconomics</td>
<td>3 hrs.</td>
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<tr>
<td>143</td>
<td>Principles of Microeconomics</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>239</td>
<td>Principles of Economics for Engineering and Science Students</td>
<td>3 hrs.</td>
</tr>
</tbody>
</table>

**142 Principles of Macroeconomics**

Economic analysis and its application in investigating the economic functional relation between business, consumers, and government. National income analysis, determination of employment and price levels, and introduction to market demand and supply analysis. Students who pass this course will not be eligible to take ECN 239 for additional credit. Prerequisite: MA 104 or 105 or recommended equivalent. Su, F, W, Sp.

**143 Principles of Microeconomics**

Continuation of ECN 142. Advanced value theory and its application to analysis of market performance under conditions ranging from competitive to monopolistic, including consideration of distribution along functional lines, and economic growth. Students who pass this course will not be eligible to take ECN 239 for additional credit. Su, F, W, Sp.

**239 Principles of Economics for Engineering and Science Students**

Basic concepts of microeconomics and macroeconomics for students with some degree of analytical capabilities. Major topics of study will include supply and demand, costs, industrial structure, resource pricing, national income accounting, determination of levels of GNP and other macroeconomic variables, and fiscal and monetary policy. Prerequisite: MA 153. Note: Students who complete this course cannot receive more than 3 hrs. degree credit from among this course, ECN 142 and ECN 143. Engineering, science, and honor students who pass ECN 239 and who later decide to major in business should complete 3 additional hours of ECN at 300 level or above. Any deviations from this requirement must be approved by the department chair. Su., F, W, Sp.

### Upper Division Courses (see prerequisites for Upper Division)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>340</td>
<td>Macroeconomic Analysis</td>
<td>3 hrs.</td>
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<tr>
<td>345</td>
<td>Microeconomic Analysis</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>375</td>
<td>Labor Markets, Wages and Employment</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>440</td>
<td>Industrial Structure and Regulation</td>
<td>3 hrs.</td>
</tr>
</tbody>
</table>

**340 Macroeconomic Analysis**

Comprehensive study of the national economic system. Interdependent market processes in determining income, consumption, saving, investment, interest, employment, and the price level. Economic growth as influenced by institutional structure, technological change, business management, and government monetary and fiscal policy. Application of economic accounting structure and method. Prerequisite: ECN 143, and permission of the department chair.

**345 Microeconomic Analysis**

Economic principles underlying value and distribution with additional training in application of these principles to problems of analysis. Prerequisite: ECN 143, and permission of the department chair.

**375 Labor Markets, Wages and Employment**

Economic analysis of labor markets at the micro and macroeconomic level. Topics include the determination of labor force participation, hours of work, education, job search, labor turnover, productivity, and unemployment. Prerequisite: Permission of the Department Chair.

**440 Industrial Structure and Regulation**

Microeconomic analysis of the competitive structure in which the firm operates and its effect on economic efficiency. The various forms of government regulation applied to industries are introduced and implications for firm's behavior are analyzed. Prerequisite: Permission of the Department Chair.
448 Development of Economic Theory 3 hrs.
Historical development of economic thought from ancient times to the nineteenth century and from early modern times to present. Prerequisite: Permission of the Department Chair.

470 Seminar in Economics 3 hrs.
Extensive readings and reports reflecting current developments and trends in economic theory and its application to the decision-making process in business and government. Prerequisite: Permission of the Department Chair.

Graduate Courses

540 Industrial Structure and Regulation 3 hrs.
Microeconomic analysis of the competitive structure in which the firm operates and its effect on economic efficiency. The various forms of government regulation applied to industries are introduced and implications for firm's behavior are analyzed. Prerequisite: ECN 239 or equivalent.

548 Development of Economic Theory 3 hrs.
Historical development of economic thought from ancient times to the nineteenth century and from early modern times to present. Prerequisite: ECN 239 or equivalent.

Finance (FIN)

Upper Division Courses (see prerequisites for Upper Division)

301 Principles of Finance 3 hrs.

352 Money and Banking 3 hrs.
Organization, operation, and economic significance of monetary and banking systems. Fractional reserve banking systems, money creation, the Federal Reserve System, U.S. financial intermediaries, introduction to monetary theory and international finance. Prerequisite: ECN 143. F.

361 Equity Markets 3 hrs.
A study of the structure and performance of equity markets. Market designs and regulation, the measurement of market performance and the institutional framework of equity markets. Prerequisite: FIN 301. F.

375 Financial Institutions 3 hrs.
Role and activities of financial intermediaries as they affect flow of funds and capital formation. Money markets and capital markets in which these institutions operate. Prerequisite: FIN 301 and FIN 352. W.

378 Intermediate Finance 3 hrs.
Study of financial theory as it relates to corporate policy, the efficient market hypothesis, capital structure theory, long-term financing and dividend policies. Prerequisite: FIN 301. W.

395 Advanced Topics in Corporate Finance 3 hrs.
This course covers the role of options, warrants, convertibles, leasing, mergers, acquisitions, and pension plans in a corporate environment. Prerequisite: FIN 378.

431 Managerial Finance 3 hrs.
Financial principles applied to financial management problems such as cash management; payables and receivables management; cost of short-term credit; and forecasting and financial planning. Prerequisite: FIN 301. Lab Fee: Level 1. F.
454 International Finance 3 hrs.
Behavior of foreign-exchange rates under different monetary standards, methods of financing international trade, historical development of international financial institutions, current and proposed methods for fostering international trade, and problems of international liquidity. Prerequisite: FIN 352 and senior standing or approval of Department Chair. W, Sp.

470 Seminar in Finance 3 hrs.

490 Special Projects 3 hrs.
Independent study in an area of interest to the student in the field of Finance. Prerequisite: Senior standing and approval of Department Chair.

495 Internship in Finance 3 hrs.
Active involvement in a project in a business enterprise, professional organization or in a government agency that has particular interest and relevance to the student. Prerequisite: Senior standing and approval of Department Chair. Course grade will be given on a satisfactory (S)/unsatisfactory (U) basis.

Graduate Courses

554 International Finance 3 hrs.
Behavior of foreign-exchange rates under different monetary standards, methods of financing international trade, historical development of international financial institutions, current and proposed methods for fostering international trade, and problems of international liquidity. Prerequisite: FIN 352, graduate standing and approval of AS Graduate Coordinator. W, Sp.

Management (MGT)

Lower Division Courses

100 Introduction to Business 3 hrs.
Career options for students interested in business are stressed. Fundamentals of business organizations, effective management and the functions of business explored. Su.

101 Introduction to Entrepreneurship 3 hrs.
Introduction to the management of a small business and the entrepreneurial career. The course will focus on elementary concepts of planning, financing, developing, and managing a new business. Lab fee: Level 5. W.

Upper Division Courses (see prerequisites for Upper Division)

301 Principles of Management 3 hrs.
Elements of the managerial process fundamental to successful operation of various types of enterprises including a study of organization theory, behavior, and interpersonal communication. Prerequisite: junior standing. Lab fee: Level 2. Su, F, W, Sp.

361 Organizational Behavior 3 hrs.
Behavioral-science and social-systems approach to behavior of people at work in organizations. Behavioral decision-making, organizational theory, communication process, work motivation, groups, leadership, organizational climate, organizational development and other aspects of human behavior in organizations. Prerequisite: MGT 301. Lab fee: Level 2. F, Sp.
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
<th>Description</th>
<th>Prerequisites</th>
<th>Labs</th>
<th>Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>362</td>
<td>Management and Labor Relations</td>
<td>3 hrs.</td>
<td>Psychological and institutional factors as well as economic analysis of major aspects of such problems as employment, wages, hours, unionism, labor-management relations, and social security. Prerequisite: MGT 301. Lab fee: Level 2. F, Sp.</td>
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<tr>
<td>363</td>
<td>Personnel: Human Resource Management</td>
<td>3 hrs.</td>
<td>Theories and practices related to personnel functions such as recruitment, selection, orientation and placement, training, evaluation, promotion, and compensation. Recent research in human resource management; valuable to students majoring in other areas related to these functions. Prerequisite: MGT 301. Lab fee: Level 2. Sp, W.</td>
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<tr>
<td>405</td>
<td>Small Business Management</td>
<td>3 hrs.</td>
<td>Application of principles and practices of modern management start-up operation and control of small business firms. Role of small businesses in the economy. Opportunities and operational problems of small firms. Prerequisite: MGT 301 and senior standing. Lab fee: Level 2. W.</td>
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<tr>
<td>430</td>
<td>Business, Government, and Society</td>
<td>3 hrs.</td>
<td>The course explores the complex relationships existing between business, government, and society. Furthermore, it seeks through both the primary and auxiliary texts, to examine the ethical considerations inherent in these relationships. Prerequisite: MGT 301, MKT 301, and senior standing. Lab fee: Level 2.</td>
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<tr>
<td>440</td>
<td>Honors: Small Business Counseling</td>
<td>3 hrs.</td>
<td>Practical exposure to problems and opportunities of small business firms. Assignment of student teams as counseling unit to assist local business managers with identification of problems and formulation of alternative solutions, as well as identification of areas of opportunity within the organization. A selection of students with demonstrated ability to understand and apply knowledge from several disciplines to day-to-day operations of business enterprise. Prerequisite: approval of SBDC director. Su, F, W, Sp.</td>
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<tr>
<td>450</td>
<td>International Management</td>
<td>3 hrs.</td>
<td>Management of the multinational business enterprise in interaction with its political, economic, social, cultural, and legal environments. Prerequisite: MGT 301 and senior standing. Lab fee: Level 2. F, Sp.</td>
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<tr>
<td>460</td>
<td>Employee Training and Development</td>
<td>3 hrs.</td>
<td>Introduction to the development of employee training and development programs, assessment of training needs, program evaluation, and organizational development. Prerequisites: MGT 361, MGT 362.</td>
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<tr>
<td>461</td>
<td>Wage and Salary Administration</td>
<td>3 hrs.</td>
<td>An introduction to compensation practices, legal constraints, wage and salary determination, and benefits programs. Prerequisites: MGT 301, MGT 362, MGT 363.</td>
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<tr>
<td>470</td>
<td>Seminar in Management</td>
<td>3 hrs.</td>
<td>Selected topics in management. Prerequisite: senior standing. Lab fee: Level 2. Su., W.</td>
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<tr>
<td>490</td>
<td>Special Projects</td>
<td>3 hrs.</td>
<td>Independent study in an area of interest to the student in the field of management. Prerequisites: senior standing and approval of Department Chair.</td>
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<tr>
<td>495</td>
<td>Internship in Management</td>
<td>3 hrs.</td>
<td>Active involvement in a project in a business enterprise, professional organization or in a government agency that has particular interest and relevance to the student. Prerequisites: Senior standing, approval of the Department Chair, and subject to college’s guidelines on internships. Course grade will be given on a satisfactory (S) unsatisfactory (U) basis.</td>
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<td>Course Code</td>
<td>Course Title</td>
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<tr>
<td>499</td>
<td>Business Policy</td>
<td>3 hrs.</td>
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<td></td>
<td>Integration of principles and methods acquired in the core curriculum of business strategy, policy, and management action. The course involves the study of administrative processes under conditions of uncertainty including integrating analysis and policy determination. The course includes analysis of comprehensive business cases and the opportunity to acquire skills in diagnosing and solving complex business problems in local firms through one of the college’s centers. This course should be taken with 6 or fewer semester hours. Prerequisite: senior standing, completion of all other core courses, EH 300, and 50% of major courses. Lab fee: Level 3. Su, F, W, Sp.</td>
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<td>505</td>
<td>Small Business Management</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Application of principles and practices of modern management start-up operation and control of small business firms. Role of small business in the economy. Opportunities and operational problems of small firms. Prerequisite: Graduate standing and approval of the college’s Graduate Advisor. W.</td>
<td></td>
</tr>
<tr>
<td>540</td>
<td>Small Business Counseling</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Practical exposure to problems and opportunities of small business firms. Assignment of student teams as counseling unit to assist local business managers with identification of problems and formulation of alternative solutions, as well as identification of areas of opportunity within the organization. A selection of students with demonstrated ability to understand and apply knowledge from several disciplines to day-to-day operations of business enterprise. Prerequisite: Graduate standing and approval of the college’s Graduate Advisor. Su, F, W, Sp.</td>
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</tr>
<tr>
<td>550</td>
<td>International Management</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Management of the multinational business enterprise in interaction with its political, economic, social, cultural, and legal environments. Prerequisite: MGT 301 and graduate standing. Lab Fee: Level 2. F, Sp.</td>
<td></td>
</tr>
<tr>
<td>570</td>
<td>Seminar in Management</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Selected Topics in management. Prerequisite: Approval of college’s Graduate Coordinator. Lab Fee: Level 2. Su, W.</td>
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<tr>
<td>595</td>
<td>Internship in Management</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Active involvement in a project in a business enterprise, professional organization or in a government agency that has particular interest and relevance to the student. Prerequisites: graduate standing, approval of department chair, and subject to college’s guidelines on internships.</td>
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<tr>
<td>622</td>
<td>Human Behavior in Organizations</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Organization as a continuing social system. Problems of motivation and incentives, organizational communication, and their blockages. Selection, training, promotion, and severance of organizational members. Prerequisite: MGT 301. Lab Fee: Level 1. F, Sp.</td>
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<tr>
<td>623</td>
<td>Organizational Theory</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Theories of organizations and their structures. Organizations from the perspectives of management, psychology, sociology, political science, and economics. Organizations as groups of people and as systems in multiple environments. Goals, resources, effectiveness, equilibrium, and change relating to organizations. Administration’s relationships with organization with emphasis on research and assessment. Prerequisite: MGT 301. Lab Fee: Level 2. W, Su.</td>
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</tbody>
</table>
624 Organizational Problems 3 hrs.
Organizational and group interface problems and processes and principles bearing on their solutions by simulations, case analysis, and structured interactions. Prerequisites: MGT 622 and MGT 623. Lab Fee: Level 3. F, Sp.

625 Labor Relations and the External Environment 3 hrs.
Relationships between management and organized labor and between organizations and the world outside their confines. Development of organized labor in the U.S. and major legislation-affective relations between management and labor. Collective bargaining process and administration of the resulting contract from the standpoints of management and labor. Effects of the social, economic, political, and technological environments of labor relations and on the organization’s relations with the external environment. The public and news media impact upon management actions. Lab Fee: Level 2. Sp.

629 Leadership and Motivation 3 hrs.
Authority and leadership styles and their effectiveness in different types and levels of organization. Theories of personnel motivation and their practicability and effectiveness. The critical role of effective communication in leadership and motivation. Prerequisite: MGT 622. Lab Fee: Level 2. W.

631 Personnel Administration in Organizations 3 hrs.
Traditional and contemporary theories of purposes, functions, and processes of personnel administration needs of large complex organizations in both the private and public sector. Elements of a comprehensive personnel program in relation to the total management. Lab Fee: Level 2. F.

635 Management Internship 3 hrs.
Management internships will provide the opportunity to observe and participate in local industries and organizations. Students will be required to keep a log of activities and submit a final report. Prerequisite: minimum of 12 hours completed in MSM Program.

640 Principles of Project Management 3 hrs.
The conceptual foundation and organization of project management. The project life cycle, planning, control, marketing, utilization of human resources, and financial management. F.

650 Selected Research Topics 3 hrs.
Research in a particular topic relevant to administrative science by one student or a group of students. The research paper must be an original contribution showing a research design and results that meet the highest standards of social science research. Prerequisite: completion of 15 hours of student’s curriculum and approval of the College’s Graduate Program Advisory Committee.

698 Strategic Management 3 hrs.
Administrative decision making with emphasis on analyzing a complex business situation, evaluating historical trends, current operational conditions, and environmental settings, in order to establish: a unifying strategy; implementation of integrated functional policies; and a plan of action to achieve established objectives. Prerequisites: Completion of all management core. Lab Fee: Level 2. F.

699 Masters Thesis 3 hrs.
Required each term the student is working and receiving direction on his/her masters’ thesis. Maximum of six hours credit may be applied toward the degree. Prerequisites: Completion of core and major option.
Management Information Systems (MIS)

Lower Division Courses

101 Microcomputing I 1 hr.
An introduction to the use of microcomputing hardware and software with an emphasis on microcomputer operating system and spreadsheet software. Lab fee: Level 1.

102 Microcomputing II 1 hr.
An introduction to word processing software and advanced topics in the use of spreadsheet software. Prerequisite MIS 101. Lab Fee: Level 1.

201 Computer Applications in Business 3 hrs.
Evaluation of digital computers. Overall structure of computer problem solving and method of constructing computer solution. Overview of hardware/software systems. Data and information processing in organizations and other computer uses in management. Programming in BASIC and the use of business software packages such as word processing, decision support systems, spreadsheets and database concepts on Personal Computers. Applications and examples will generally be from administrative areas. Prerequisites: MIS 102, MA 121 or MA 143 or Level III placement. Lab fee: Level 5.

210 Introduction to Computer Programming in Business 3 hrs.
Fundamentals of structured design and programming using a procedural language such as COBOL. Table handling and hierarchical data structure. Prerequisites: MIS 201 or CS 108. Lab fee: Level 6.

Upper Division Courses (see prerequisites for Upper Division)

301 Information Systems in Organizations 3 hrs.
Understanding the role of information systems in organizations and how they relate to organizational objectives and organizational structure. Introduces information system applications. Prerequisites: MIS 102, MIS 201, MSC 287, ACC 211, and ACC 212. Lab fee: Level 4.

310 Advanced Computer Programming in Business 3 hrs.
Advanced business language such as COBOL features, control language and file handling (sequential, random and indexed sequential), Program structure documentation, and maintenance. Course project in development and documentation of significant business application. Prerequisite: MIS 210. Lab fee: Level 6. Su, W.

340 Data Bases for Management 3 hrs.
The management of data resources to effectively support the information systems of organizations. Concepts supported by use of current DBMS software on mainframe and/or PC. Prerequisite: MIS 210, MIS 301. Lab fee: Level 6.

350 Advanced Data Bases for Management 3 hrs.
In-depth investigation of data modeling, system development, and data administration in a database environment. Course project in development and documentation of significant business applications. Prerequisite: MIS 340. Lab fee: Level 6.

Analysis of information system components and technologies which aid the manager in the decision making process. Concepts supported by use of current DSS/ES software. Prerequisites: MIS 301, MGT 301, MKT 301, FIN 301, and MSC 385. Lab fee: Level 3.

407 Accounting Information Systems 3 hrs.
Design, operation, analysis of accounting information systems with respect to data input, processing, storage, recall, security, internal control, and the audit trail.
Emphasis will be placed on computerized systems. Prerequisites: MIS 301, ACC 212.
( Same as ACC 407). Lab fee: Level 4.

412 Information Systems Design and Implementation 3 hrs. Advanced coverage of the strategies and techniques of structured systems development. Emphasizes information analysis and the logical specifications of the system. Students prepare exercises and case studies to develop proficiency in information analysis techniques. Integrates computer technology, systems analysis, systems design, and organizational behavior in designing large scale application or decision support systems. Prerequisites: MIS 210, MIS 301. Lab fee: Level 6.

460 Seminar in Telecommunications & Distributed Processing 3 hrs. Overview of geographically distributed computer-communications facilities. Network design, structure and optimization are addressed. Regulated common carriers, data transmission, routine techniques, reliability, protocols, error detection, modems and controllers are included. Prerequisite: MIS 301. Lab Fee: Level 2.

475 Information Resource Management 3 hrs. Overview of the management of the information systems resources of the firm. Prerequisite: MIS 412. Lab fee: Level 3.

480 Seminar in Management Information Systems 3 hrs. Selected topics in Management Information Systems. Topics will reflect the contemporary issues and current technological advancements which impact the development, implementation and management of effective information systems in organizations. Prerequisites: senior standing and approval of Department Chair. Lab fee: Level 5.

490 Special Projects 3 hrs. Independent study in an area of interest to the student in the field on Management Information Systems. Prerequisite: senior standing and approval of Department Chair. Lab fee: Level 5.

495 Internship in Information Systems 3 hrs. Active involvement in a project in a business enterprise, professional organization or in a government agency that has particular interest and relevance to the student. Prerequisites: senior standing and approval of Department Chair. Course grade will be given on a satisfactory (S)/unsatisfactory (U) basis.

499 Systems Development Project 3 hrs. A capstone course emphasizing the development of a computer application via the life cycle methodology. Term projects will produce current system specifications, devise logical system design, develop a physical design for a new design and implement the design to the extent possible. Prerequisite: MIS 412, MIS 475, MIS 310 or MIS 350. Lab fee: Level 6.

Graduate Courses

500 Decision Support Systems and Expert Systems 3 hrs. Analysis of information system components and technologies which aid the manager in the decision making process. Concepts supported by use of current DSS/ES software. Prerequisites: MIS 301, MGT 301, MKT 301, FIN 301 and MSC 385. Lab Fee: Level 3.

507 Accounting Information Systems 3 hrs. Design, operation, analysis of accounting information systems with respect to data input, processing, storage, recall, security, internal control, and the audit trail. Emphasis is on computer-oriented systems. Prerequisites: ACC 212, MIS 301. Lab Fee: Level 4. (Same as ACC 507).
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>560</td>
<td>Seminar in Telecommunications &amp; Distributed Processing</td>
<td>3 hrs.</td>
<td>Overview of geographically distributed computer-communications facilities. Network design, structure and optimization are addressed. Regulated common carriers, data transmission, routine techniques, reliability, protocols, error detection, modems and controllers are included. Prerequisite: MIS 301. Lab Fee: Level 2.</td>
</tr>
<tr>
<td>634</td>
<td>Seminar in Management Information Systems</td>
<td>3 hrs.</td>
<td>Extensive readings and research into current developments and trends on management information systems. Prerequisites: MIS 301. Lab Fee: Level 3.</td>
</tr>
<tr>
<td>650</td>
<td>Selected Research Topics</td>
<td>3 hrs.</td>
<td>Research in a particular topic relevant to management information systems by one student or a group of students. Each student’s research paper must be an original contribution showing a research design and results that meet the highest standard of management information systems research. Prerequisites: 12 additional hours of graduate courses and approval of department chair. Lab Fee: Level 3.</td>
</tr>
<tr>
<td>670</td>
<td>Information Systems Analysis and Design</td>
<td>3 hrs.</td>
<td>Study of methodologies for the analysis of system requirements, including data base requirements, and the design of systems to meet these requirements. Prerequisite: MIS 301. Lab Fee: Level 3.</td>
</tr>
<tr>
<td>675</td>
<td>Information Resource Management</td>
<td>3 hrs.</td>
<td>Overview of the management of the information systems resources of the firm. Prerequisite: permission of the department chair. Lab Fee: Level 4.</td>
</tr>
<tr>
<td>699</td>
<td>Master’s Thesis</td>
<td>3 hrs.</td>
<td>A course required each term a student is working and receiving direction on a master’s thesis. A minimum of two terms is required but no more than six hours credit is allowed for the thesis. Credit awarded upon successful completion of thesis. Prerequisites: Common body of knowledge as defined in graduate catalog and completion of Administrative Science core courses.</td>
</tr>
</tbody>
</table>

Management Science (MSC)

**Lower Division Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>287</td>
<td>Introduction to Business Statistics</td>
<td>3 hrs.</td>
<td>Introduction to the concepts of probability and business statistics. Topics include collection, classification, and presentation of data, measures of central tendency, and dispersion of data; probability distributions; confidence limits and hypothesis testing. Prerequisite: MIS 101, MA 143, or MA 151 or equivalents. Lab fee: Level 5.</td>
</tr>
</tbody>
</table>

**Upper Division Courses (see prerequisites for Upper Division)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>325</td>
<td>Quantitative Methods in Business</td>
<td>3 hrs.</td>
<td>Statistical and quantitative modeling and problem solving methods used in business. Topics include correlation, Chi-square, analysis of variance, regression, linear programming, decision theory, simulation, and queueing analysis. Prerequisite: MA 151, MIS 201, MSC 287. Lab fee: Level 5.</td>
</tr>
<tr>
<td>385</td>
<td>Production/Operations Management</td>
<td>3 hrs.</td>
<td>Survey of the concepts, processes, and institutions involved with the production function of the firm. Topics include forecasting, production planning, and control, materials management, and quality control. Applications of management science tools to production problems. Prerequisites: MA 151, MIS 201, MSC 287, MSC 325. Lab fee: Level 5.</td>
</tr>
</tbody>
</table>
Analysis of information system components and technologies which aid the manager in the decision making process. Concepts supported by use of current DSS/ES software. Prerequisites: MIS 301, MGT 301, MKT 301, FIN 301, and MSC 385. Lab Fee: Level 3.

470 International Production Management 3 hrs.
Current topics related to international production management, such as Japanese production management systems, “off shore” production arrangements, joint production systems, vertical quality management. Prerequisites: MSC 385.

486 Advanced Production/Operations Management 3 hrs.
Further examination of the concepts, processes, and institutions involved with the production function of the firm. Topics include forecasting, production planning and control, materials management, and quality control. Applications of management science tools to production problems. Prerequisite: MSC 385. Lab Fee: Level 3.

490 Special Projects 3 hrs.
Independent study in an area of interest to the student in the field of Management Science. Prerequisites: senior standing and approval of Department Chair.

495 Internship in Management Science 3 hrs.
Active involvement in a project in a business enterprise, professional organization or in a government agency that has particular interest and relevance to the student. Prerequisites: senior standing and approval of Department Chair. Course grade will be given on a satisfactory (S)/unsatisfactory (U) basis.

Graduate Courses

An analysis of information support systems which aid the manager in the decision making process. Prerequisites: MSC 385, MGT 301, MKT 301, FIN 301, MIS 301. Lab Fee: Level 3.

570 International Production Management 3 hrs.
Current topics related to international production management, such as Japanese production management systems, “off shore” production arrangements, joint production systems, vertical quality management. Prerequisites: MSC 385, or concurrent with MSC 651. Lab Fee: Level 3.

586 Advanced Production/Operations Management 3 hrs.
Further examination of the concepts, processes, and institutions involved with the production function of the firm. Topics include forecasting, production planning and control, materials management, and quality control. Applications of management science tools to production problems. Prerequisite: MSC 385. Lab Fee: Level 3.

641 Project Management Planning and Control 3 hrs.
Modeling and analysis of projects and other systems problems using PERT, CPM, and other network techniques. Managerial aspects of modeling techniques. Prerequisites: MSC 325. Lab Fee: Level 3.

642 Management Science 3 hrs.
Concepts and applications of deterministic and stochastic management tools. Topics include linear programming, sensitivity analysis, transportation and assignment problems, queueing theory. Prerequisites: MSC 287. Lab Fee: Level 3.
650 Selected Research Topics 3 hrs.
Research in a particular topic relevant to management science by one student or a
group of students. Each student’s research paper must be an original contribution
showing a research design and results that meet the highest standard of management
science research. Prerequisites: MSC 325, 12 additional credit hours of graduate
courses; and approval of the department chair. Lab Fee: Level 3.

651 Operations Management 3 hrs.
Study of organizational production and operation problems and techniques applied
in solving them. Capacity planning, location and distribution demand forecasting,
inventory control, maintaining system reliability, process and job design. Prerequi­
site: MSC 642. Lab Fee: Level 3.

690 Seminar in Management of Technology 3 hrs.
Practical management of technology methods and techniques from current research
and successful industrial practice. Examines the state of the art in industrial new
product development management. Lectures, cases, readings and an emphasis on
student discussions, presentations and interactions. The course has a strong research
orientation, while at the same time focusing on management policies and principles.
Prerequisites: MGT 622, FIN 301 or equivalent.

699 Master’s Thesis 3 hrs.
A course required each term a student is working and receiving direction on a mas­
ter’s thesis. A minimum of two terms is required but no more than six hours credit is
allowed for the thesis. Credit awarded upon successful completion. Prerequisite:
Common body of knowledge as defined in graduate catalog and completion of ADSC
core courses.

Marketing (MKT)
Upper Division Courses (see prerequisites for Upper Division)

301 Principles of Marketing 3 hrs.
Integration and study of functional commodity, and institutional approaches from
viewpoint of consumer and marketing manager. Prerequisite: junior standing. Su, F,
W, Sp.

315 Sales Management and Professional Selling 3 hrs.
Integration of techniques and concepts of professional selling with problems of sales
management. Objectives and policies for sales managers concerning managing sales
force and methods of marketing analysis in terms of sales forecasts and budgeting.
Problems faced by sales management in competition, pricing, and promotion. Pre­
requisite: MKT 301. Lab fee: Level 2. F, W.

316 Retailing Policy and Management 3 hrs.
Policies, practices, and problem solutions in efficient operation of chain and inde­
pendent retail stores. Store location, organizational layout, merchandise planning and
control, buying, pricing, and promotion. Prerequisite: MKT 301. Lab fee: Level 2.

332 Consumer Behavior 3 hrs.
Interdisciplinary approach to analyze and interpret consumer buying habits and
motives and the resultant purchases of goods and services. Purchaser’s psychologi­
cal, economic, and sociocultural actions and reactions as they relate to better under­
standing of consumption. Prerequisite: MKT 301. Lab fee: Level 2. W., Sp.
342 Promotional Strategy 3 hrs.
Promotional techniques available to marketing management. Consumer behavior and communication process means by which products can be effectively promoted. Specific tools of personal selling, advertising, sales promotion, and publicity as components of overall promotional strategy. Prerequisite: MKT 301. Lab fee: Level 2.

343 Marketing Research Design 3 hrs.
Introduction to the principles and purposes of marketing research; relationship to other marketing functions and marketing information systems, data sources, review of research methodologies and ethical considerations. Prerequisites: MKT 301 and MSC 287. Lab fee: Level 3. W. Sp.

344 Marketing Research Applications 3 hrs.
Application of the principles and purposes of marketing research; laboratory, field and historical research methodologies, experimental design, sampling procedures, questionnaire design, and data analysis. Prerequisites: MSC 287, MKT 301, MSC 325, and MKT 343. Lab fee: Level 3.

345 Market Channel Structure and Strategy 3 hrs.
Marketing channels as a functional area and the alternative choices available to marketing management in developing overall marketing strategy. Institutional structures and dynamic interrelationships in distribution logistics. Prerequisite: MKT 301. Lab fee: Level 2.

414 New Product Development 3 hrs.
Comprehensive review of the new product development process. Specialized application of marketing research and marketing strategy to new product development, concept development and concept testing. Prerequisites: MKT 301, MSC 325, MKT 343, MKT 344. Lab fee: Level 2.

415 International Marketing 3 hrs.
Procedures and problems associated with establishing and carrying out marketing operations in or with foreign companies. Institutions, principles, and methods involved in solving these business problems. Effect of national differences in business practices and regulation. Prerequisite: MKT 301 and senior standing. Lab fee: Level 2. F, Sp.

470 Seminar in Marketing 3 hrs.
Review of selected classics in the literature. Recent developments in marketing theory and application to marketing problem solving. Prerequisite: senior standing. Lab fee: Level 2. F, W.

480 Marketing Management 3 hrs.
Management of marketing function of the firm; determination of objectives, organization and controls for effective utilization of marketing resources in coordinated effort with other major functional areas. Identification and selection of market opportunities. Competitive strategies and development of marketing policies and programs. Prerequisite: MSC 325, MKT 332, MKT 343, MKT 344, and senior standing. Lab fee: Level 2. F, Sp.

490 Special Projects 3 hrs.
Independent study in an area of interest to the student in the field of marketing. Prerequisite: senior standing and approval of the Department Chair.

495 Internship in Marketing 3 hrs.
Active involvement in a project in a business enterprise, professional organization or
in government agency that has particular interest and relevance to the student. Pre-
requisite: Senior standing, approval of Department Chair, and subject to colleges’
guidelines on internship. Course grade will be given on a satisfactory (S)/unsatisfac-
tory (U) basis.

Graduate Courses

515 International Marketing 3 hrs.
Procedures and problems associated with establishing and carrying our marketing op-
erations in or with foreign companies. Institutions, principles, and methods involved
in solving these business problems. Effect of national differences in business prac-
tices and regulation. Prerequisite: MKT 301 and graduate standing. Lab Fee: Level

570 Seminar in Marketing 3 hrs.
Review of selected classics in the literature. Recent developments in marketing the-
ory and application to marketing problem solving. Prerequisite: Graduate standing
and approval of AS Graduate Coordinator. Lab Fee: Level 2. F, W.

580 Marketing Management 3 hrs.
Management of marketing function of the firm: determination of objectives, organi-
ization and controls for effective utilization of marketing resources in coordinated effort
with other major functional areas. Identification and selection of market opportuni-
ties. Competitive strategies and development of marketing policies and programs.
Prerequisites: 15 hours in marketing or approval of Graduate Coordinator. Lab Fee:
Level 2. F, Sp.

606 Strategic Marketing Management 3 hrs.
Comprehensive review of the nature and application of strategic marketing manage-
ment decision making. Includes particular emphasis on the start to finish sequence of
decisions necessary in new product development. Prerequisites: MKT 301.

Procurement Management (PRM)

301 Introduction to Procurement 3 hrs.
Explores the primary aspects of the procurement and management of material re-
sources necessary for government or business operation. Introduction will be made
to the broad concepts of procurement and material management to include the gen-
eration of a requirement, forecasting, funding, the procurement cycle through award
of a contract, inventory control, and distribution. Prerequisite: MSC 385. Lab fee:
Level 1. F.

302 Contract Administration 3 hrs.
Intensive review of contract administration functions and responsibilities beginning
when a contract is awarded and continuing until the contract is terminated or deliv-
er is made and all aspects of the contract have been performed. It includes consider-
ation of the roles of small business and sub-contractors. Prerequisite: PRM 301.
Lab fee: Level 2. W.

303 Cost and Price Analysis 3 hrs.
Presents the tools and techniques available to the student for cost/price estimating,
cost/price analysis, projection techniques, factors affecting profit or fee, the weighted
guidelines technique of profit analysis and application of the learning curve theory.
After cost/price analysis has been performed, negotiation strategies and techniques
are developed. Prerequisite: PRM 301. Lab fee: Level 2. W.

404 Negotiation Techniques 3 hrs.
Develops principles, skills and techniques for effective negotiation of procurement
actions. Includes verbal and nonverbal mannerisms, need to communicate, team approach, buyer’s preparation for negotiations, and various tactics and strategies for negotiating. Prerequisites: senior standing and PRM 303. Lab fee: Level 2. Sp.

405 Government Contract Law 3 hrs.
Application of the legal principles governing government contracts as evolved from common law, statutes, regulations, and court and board decisions. Application of law to each step of the federal procurement and federal assistance process. Prerequisites: senior standing, PRM 302, 303 and BLS 211. Lab fee: Level 2. Sp.

Graduate Courses

504 Negotiation Techniques 3 hrs.
Develops principles, skills, and techniques for effective negotiations of procurement actions. Includes verbal and nonverbal mannerisms, need to communicate, team approach, buyer’s preparation for negotiations, and various tactics and strategies for negotiating. Prerequisite: Graduate standing. Lab Fee: Level 2.

505 Government Contract Law 3 hrs.
Application of the legal principles governing contracts as evolved from common law, statues, regulations, and court and board decisions. Applications of law to each step of the federal procurement and federal assistance process. Prerequisite: graduate standing. Lab Fee: Level 2.

671 Acquisition Management I 3 hrs.
The budgeting and major systems acquisition policies and procedures of the Department of Defense, Federal Acquisition Regulations (FARS), requirements determination, and cost estimating techniques and methodologies. (Same as ISE 671) Prerequisite: ISE 690

672 Acquisition Management II 3 hrs.
Department of Defense Contract Administration and organization, source evaluation and selection, types of contracts, solicitations, negotiations, subcontracts, legislative requirements and impacts, contract termination and litigation. (Same as ISE 672) Prerequisite: PRM 671.
College of Engineering

Dean Lynn D. Russell, BSME, MSME, Ph.D., P.E., Professor of Mechanical Engineering; Associate Dean Kenneth O. Thompson, B.S., B.A.E., B.B.A., M.S., Ph.D., Associate Professor Emeritus.

Engineering is the profession that translates scientific thought into reality. By combining synthesis, analysis and design in creative and innovative modes the engineer produces systems, processes and products for the benefit of mankind. Those who desire to be part of this important effort can gain entry into the engineering profession by attending UAH. The UAH College of Engineering is located in an urban area and also in the state’s high technology area. Close proximity to the Marshall Space Flight Center, Redstone Arsenal and much of Alabama’s fastest growing technological industry gives the College of Engineering a special character that leads to outstanding educational opportunities for its students. This special setting combined with a high quality faculty affords maximum growth potential for those desiring to pursue a career in engineering.

The UAH College of Engineering is strongly committed to the advising of both undergraduate and graduate students. As such, students are requested to contact the Dean’s Office as soon as possible for initial advising.

Degrees and Programs

Bachelor of Science in Engineering degrees can be earned in chemical engineering, civil engineering, computer engineering, electrical engineering, industrial and systems engineering, mechanical engineering (including a concentration in aerospace engineering), and optical engineering. The undergraduate engineering programs are built around a core consisting of courses in mathematics, the physical sciences, humanities, and engineering. Students then take additional engineering courses in the areas of their specializations. The net result is that at UAH, engineering students first develop breadth in important fundamental areas and then depth in their particular field of specialization. This gives an added dimension to UAH engineering graduates that enhances their professional performance. The UAH engineering student is also able to obtain real world engineering experience through the Cooperative Education Program or by part-time work with the many governmental and industrial facilities in Huntsville. Graduate degrees offered in engineering include the Master of Science in Engineering, a Master of Science in Operations Research and the Doctor of Philosophy. Interaction with the high technology area of Huntsville strongly enhances the high quality engineering graduate programs and thereby offers the candidate a degree that has added significance.
When desirable, as evidenced from continuous studies, the College of Engineering may modify its curricula and specific courses of instruction, alter requirements for admission or for graduation, and change degrees to be awarded.

**Requirements for an Engineering Cluster**

Students with nonengineering majors who choose cluster in engineering, must take a minimum of 21 hours in engineering courses exclusive of the prerequisites. Each engineering program director will maintain one or more lists of specific courses comprising an approved cluster. Students must have the intended cluster approved by the College of Engineering prior to enrollment in engineering courses.

**Course Numbers**

Course numbers are coded for engineering by prefixes as follows:

- Chemical Engineering: CHE
- Civil Engineering: CE
- Computer Engineering: CPE
- Electrical Engineering: EE
- Industrial and Systems Engineering: ISE
- Mechanical Engineering: ME
- Optical Engineering: OPE

**Undergraduate Engineering Program**

**Bachelor of Science in Engineering Degree Program**

The engineering program has as its primary objective the preparation of qualified students for careers in any one of many engineering disciplines, for research, and for advanced studies. It stresses a broad education in mathematics, physical sciences, liberal arts, social sciences, engineering science, and engineering design and synthesis.

The College of Engineering achieves this objective by offering a unified program of undergraduate engineering studies that serve as a foundation for creative participation in most areas of engineering, especially those High School Preparation, Prerequisite and Transfer Courses associated with new evolving technologies. All engineering students follow a common curriculum with specialization in the junior and senior years in chemical engineering, civil engineering, computer engineering, electrical engineering, industrial and systems engineering, optical engineering, or mechanical engineering. The chemical engineering, civil engineering, electrical engineering, industrial and systems engineering, and mechanical engineering options are accredited by the Accreditation Board for Engineering and Technology (ABET). The other options are under preparation for ABET accreditation evaluation. The degree awarded is the Bachelor of Science in Engineering (B.S.E.)

**High School Preparation, Prerequisite Courses, and Transfer Credit**

Students who intend to pursue the BSE degree should read the section Admission to the Freshman Class. Students who have had inadequate preparation or who are placed in certain lower-level classes because of results of placement tests will have to take one or more of the following courses.

- EH 003 Basic English: No credit
- EH 101 Freshman Composition: 3 hrs.
- CH 101 General Chemistry: 3 hrs.
- CH 105 General Chemistry Laboratory: 1 hr.
MA 119 Precalculus I ................................................................. 3 hrs.
MA 121 Precalculus II ............................................................... 3 hrs.

These courses carry the academic credit indicated and will appear on transcripts of students who successfully complete the courses. Since these courses are prerequisite to courses required for the B.S.E., credit earned in one or more of these courses cannot be applied toward the minimum requirement for the B.S.E.

Credit for engineering courses taken in schools with ABET accredited programs is transferrable to UAH. Engineering courses taken in non-ABET accredited programs may also be applied to a B.S.E. degree based on an appropriate examination (written or oral) at the discretion of the respective department. All inquiries concerning applicability of credit should be made to the Associate Dean of Engineering.

Each student in the College of Engineering, especially those transferring from other institutions, must assume the responsibility for registering for all required courses in their proper sequence and for fulfilling all requirements for admission and graduation. Failure to do so may extend the time required for graduation. Each student should seek counseling and advice from the appropriate department or from the office of the dean.

The College of Engineering requires, after matriculation, that a grade of C or better be earned in each course that serves as a prerequisite to any course applied toward completing BSE degree requirements. If a grade of less than C is received in a course taken at UAH which is a prerequisite course, the course must be repeated and a grade of C or better earned BEFORE a student enrolls in the subsequent course. At UAH only one repeat attempt or a total of two attempts are allowed in any of these prerequisite courses.

To register for an engineering course at the 300-level or above, with the exceptions of ISE 321, EE 300, and ME 362, an undergraduate student must be admitted to an option in the College of Engineering, or the desired course must be listed on the student’s approved program of study.

Students who have been admitted to preengineering may be admitted to one of the options if they have completed a minimum of MA 153, MA 154, CH 121, CH 125, and EE 197 and have a grade point average of at least 2.5/4.0 in all courses attempted in mathematics, chemistry, physics and engineering. Students who have not met this criterion by the time they have completed all required sophomore courses, and ISE 321, EE 300, and ME/CE 362 will not be permitted to take further engineering courses.

Any student admitted to the College of Engineering who is subsequently suspended from the University must, upon readmission to the University, reapply for admission to the College of Engineering.

Course Requirements

Students must successfully complete courses in each of six categories. The normally required courses are shown; however, the Dean of Engineering may approve other courses which also meet ABET guidelines.

<table>
<thead>
<tr>
<th>Course Requirement</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Engineering core</td>
<td>(25 hours)</td>
</tr>
<tr>
<td>FORTRAN Programming - EE 197</td>
<td>3</td>
</tr>
<tr>
<td>Statics - ME/CE 271</td>
<td>3</td>
</tr>
<tr>
<td>Nature and Properties of Materials - ME/CHE 294</td>
<td>4</td>
</tr>
<tr>
<td>Electrical Circuits I - EE 300</td>
<td>3</td>
</tr>
<tr>
<td>Electronic Instrumentation Lab - EE 301</td>
<td>1</td>
</tr>
<tr>
<td>Electronic Instrumentation - EE 311</td>
<td>3</td>
</tr>
<tr>
<td>Engineering Economy - ISE 321</td>
<td>3</td>
</tr>
<tr>
<td>Dynamics - ME/CE 362</td>
<td>3</td>
</tr>
<tr>
<td>Introduction to Engineering Design - ME 493</td>
<td>2</td>
</tr>
</tbody>
</table>
2. English - EH 301 .................................................................................................................. 3

3. Humanities and social sciences ......................................................................................... (18 hours)
   Engineering students are required to take a total of 18 semester hours (in addition to EH) in the humanities and social sciences, including EC 239 and AHS 392. The remaining 12 semester hours should be a balanced choice from the following areas: art history, literature, history, music appreciation, philosophy, sociology, psychology, political science, economics, and foreign languages other than a student’s native language(s). No more than six hours should be at the introductory level (courses with no prerequisites), and a two-course sequence in a given area is necessary to develop depth. ABET does not accept CM 110, 113, 201, or 301 as satisfying humanities and social science requirements.
   Courses should be elected to fulfill an objective appropriate to the engineering profession. Courses treating subjects such as accounting, industrial management, finance, personnel administration, and ROTC normally do not fulfill this objective regardless of their general value in the total engineering curriculum.

4. Mathematics .................................................................................................................... (18 hours)
   Calculus and Analytic Geometry - MA 153, 154, 233, 251 ................................................. 12
   Linear Algebra - MA 244 ................................................................................................. 3
   Differential Equations - MA 352 ...................................................................................... 3

5. Basic Sciences (12 and additional hours)
   General Physics - PH 111, 112 ....................................................................................... 8
   Chemistry - CH 121, 125 ................................................................................................. 4
   Additional courses are listed under each option.

6. Engineering options
   Students are required to take one of the following options:
   Chemical Engineering
   Civil Engineering
   Computer Engineering
   Electrical Engineering
   Industrial and Systems Engineering
   Mechanical Engineering
   Each of these options is described under the portion of the catalog devoted to the respective programs.

Graduate Degrees and Programs
   The College of Engineering offers programs leading to the degrees of Master of Science in Engineering, Master of Science in Operations Research, and Doctor of Philosophy. Specializations for the M.S.E. and Ph.D. are in the following areas:
   Applied Mechanics
   Atmospheric Dynamics
   Combustion, Propulsion
   Communications and Information Theory
   Composites
   Computer Engineering
   Computational Fluid Dynamics
   Control Sciences
   Digital and Neural Computer Architecture
   Electromagnetics, Microwaves and Antennas
   Electro-Optics and Optical Engineering
   Energy/Power
Engineering Management
Environmental Engineering
Heat and Mass Transfer
Human Factors Engineering
Manufacturing Systems Engineering
Materials Engineering
Network Theory
Operations Research
Process Dynamics
Product Assurance
Radar Systems
Reaction Engineering
Software Engineering
Solar Terrestrial Environment
Solid State Electronics
Structural Engineering
System Engineering
Thermodynamics, Heat & Mass Transfer

In addition to the above, the College of Engineering participates in a Ph.D. level Material Science program which is awarded jointly by The University of Alabama (Tuscaloosa), The University of Alabama at Birmingham, and The University of Alabama in Huntsville. That program is described elsewhere in this catalog. The College of Engineering also participate in a Ph.D. level Biomedical Engineering program in cooperation with the University of Alabama at Birmingham. That program is described elsewhere in this catalog.

Admission Requirements

In addition to the admission requirements specified by the School of Graduate Studies, the following are further requirements for admission to graduate study in engineering.

1. For unconditional admission, a student is required (1) to have earned a minimum of a B average in all undergraduate work attempted and in all engineering courses, (2) to have scored at least 1500 on the aptitude portion of the GRE, and (3) to have received a Bachelor’s degree in an engineering curriculum accredited by the Accreditation Board for Engineering and Technology at the time the degree was conferred. Exceptions to (3) are permissible for students in the Master of Science in Operations Research degree program.

2. Conditional admission may be granted to other students who have baccalaureate degrees and, after evaluation of the quantity and quality of their work by the major department, are considered to be prepared and capable of successfully pursuing graduate work. To continue graduate study, students admitted conditionally are required to maintain at least a B average in their first 12 semester hours of graduate coursework and to remove any other conditions imposed at the time of initial enrollment.

3. Students admitted to the University as non-degree post graduates but denied admission to Graduate School because of a deficiency in quality point average or GRE score may be reconsidered for graduate admission if they are otherwise eligible to pursue a particular engineering discipline. To be reconsidered, they must successfully complete 12 hours of courses numbered 500 or above (as recommended by the department into which admission is sought) in engineering, mathematics, or science with an average of B or better.
Master of Science in Engineering

The following general requirements for the Master's degree are specified by the College of Engineering beyond those required by the School of Graduate Studies:

1. Average grade on the courses numbered 600 and above cannot be less than B.
2. Engineering courses numbered between 500 and 599 may be taken for graduate credit with prior approval of such courses on the student's plan of study. Graduate students will be required to do extra work of appropriate nature in 500-level courses. A minimum grade of B must be attained in each engineering course designated by a number less than 600 in the plan of study; otherwise a substitution of another approved course is necessary.
3. All courses are selected by students with the counsel of advisors and are subject to approval by the appropriate department chairman and the Dean of the School of Graduate Studies. Additional coursework may be required to correct deficiencies in undergraduate subjects.
4. Each department may require one or more seminar courses in addition to other requirements.

Upon admission to graduate study by the Dean of the School of Graduate Studies, students will be referred to the appropriate department chairman. A supervisory committee, which usually is but does not have to be the same as the final examining committee, should be appointed after students have completed 12 semester hours.

Special Requirements For The M.S.E. Degree: Basic Program Of Study

The basic program of study, common to both Plan I and Plan II, contains a minimum of 24 semester hours of graduate-level coursework that must include (a) 12 hours of graduate courses in an engineering major, including supporting engineering courses; (b) first minor of six hours in an approved engineering area of specialization, (c) second minor of six hours in an engineering area other than those in (a) and (b) above or in any approved graduate area.

With prior approval, up to 12 hours of courses numbered 500-599 may be taken in fulfillment of these requirements.

Plan I (Thesis). Students selecting this plan must (a) successfully complete an approved basic program of study, (b) complete an acceptable thesis, (see statement with each 699 course), and (c) publicly present and defend the thesis.

Plan II (No Thesis). Students planning to complete degree requirements under Plan II must (a) be admitted to the Plan II program, (b) successfully complete an approved basic program of study, (c) successfully complete an approved extended program of study consisting of a minimum of nine semester hours of courses numbered 500 or above, and submit an acceptable paper on independent work, and (d) pass a comprehensive final examination. Under certain conditions students may satisfy the degree requirements by satisfactorily completing thirty-six hours. A comprehensive oral exam is required for all options.

Doctor of Philosophy

Programs leading to the degree of Doctor of Philosophy are offered in the College of Engineering and are granted on the basis of general scholarly proficiency, distinctive achievement in a special field, and demonstrated ability to do independent, original investigation. These attributes are tested in comprehensive examination and in a dissertation that must clearly and effectively present the substantial results of research. These accomplishments, rather than mere accumulation of residence and course credits, are essential considerations in awarding the Ph.D. degree.
Admission

Ph.D. candidates must be admitted to the School of Graduate Studies before being admitted to the Ph.D. program. Admission is limited to those whose backgrounds show distinct promise of success in the program.

Examinations

Students must pass three examinations before being awarded the degree. They are:

1. The preliminary examination (or entrance examination) is a written test of the student’s capability to pursue successfully the Ph.D. and aids in developing a program of study appropriate for the student. The examination may be taken at any time after the accumulation of at least 24 semester hours of graduate work beyond the baccalaureate degree and is administered by the student’s department. Upon the recommendation of the department, a student who fails this examination may repeat it after a lapse of three months. The examination may not be taken more than twice.

2. The qualifying examination (or comprehensive examination) is a written and oral test of the student's knowledge in the major and minor fields of study and is administered by the applying student’s advisory committee. An applicant must pass this examination to be admitted to candidacy for the Ph.D. degree. The following must be completed before taking the examination: (1) foreign language requirement, (2) basic program of study, (3) at least 18 hours of coursework in residence at UAH subsequent to passing the preliminary examination, and (4) advisory committee’s assurance of adequate preparation in the major and minor fields.

3. The final examination (or dissertation examination) primarily concerns research work in the candidate’s dissertation and will be taken after the dissertation has been approved by the advisory committee.

Advisory Committees

A faculty advisor appointed by the chairman of the department directs a student’s work until the preliminary examination is successfully completed. Thereafter the student immediately chooses an advisory committee, subject to acceptance by the faculty members chosen and approval by the Dean of Graduate Studies. This committee consists of at least five members of the graduate faculty—three representing the major field of study and one from each of the minor fields. The committee chairman must be a permanent faculty member.

Program of Study

Students should prepare an outline of the program of study as early as possible after the successful completion of the preliminary examination.

Major and Minor Subjects

A defined major subject or field of specialization is required of all candidates for the Ph.D. degree. The candidate must also have at least two minor subjects chosen with approval of the candidate’s advisory committee. One of the minors must be mathematics, and/or engineering mathematics as defined by the student’s department. A mathematics professor may be invited to join the committee.

All students must complete at least 60 semester hours of graduate coursework. At least 33 semester hours must be in work within related departments, including credits for the major. Of these 33 semester hours, at least 18 must be within a defined major. Of the remaining 27 semester hours, a minimum of 15 semester hours of work is required for the first minor and a minimum of 12 semester hours for the second.
Transfer of Credits
Credits from other recognized institutions may be applied to the student's program of study if so approved by the student's advisory committee and by the Dean of Graduate Studies. These credits will generally not be evaluated until the student has been in residence study at UAH for at least one term and has passed the preliminary examination.

Admission to Candidacy for the Degree
A student should apply for admission to candidacy for the Ph.D. degree after passing the qualifying examination and obtaining approval of the dissertation subject from his advisory committee. The student must be admitted to candidacy at least six months before the degree is awarded.

Residence Requirements
The minimum period in which the doctoral degree can be earned is three full academic years in graduate study or their equivalent. The student must complete a minimum of 24 semester hours of graduate work in three consecutive terms during the second or third year, or both, of graduate study in the School of Graduate Studies at UAH. Half-time graduate assistants are required to complete a minimum of 18 hours of graduate work in three consecutive terms.

Language Requirements
The student must satisfy the language requirement before applying for permission to take the qualifying examination in one of the ways specified by the School of Graduate Studies.

Dissertation Registration
Students must register for a minimum of 18 semester hours of dissertation supervision during the time they are actively conducting research and consulting their dissertation advisor.

Cooperative Programs with the University of Alabama at Birmingham (UAB)
A cooperative program in engineering was initiated between UAH and UAB for the pursuit of doctoral degrees. A student at UAB may earn the doctoral degree at UAH with a major in electrical engineering, computer engineering, or mechanical engineering; while at UAH a student may pursue the master or the doctoral degree with a major in biomedical engineering at UAB. An interested student must first be admitted at the principal institution, i.e., the one offering the degree, but may take courses and satisfy the residency requirements at either campus. All degree requirements must be satisfied at the principal institution. More details are available through the participating departments.

CHEMICAL ENGINEERING

Degrees: Bachelor of Science in Engineering
Master of Science in Engineering
Doctor of Philosophy

Professor Emeritus Grohse; Associate Professors Chen, Nadarajah, Smith (director); Assistant Professor Thomas.

Chemical engineering deals with any situation in which changes in the chemical composition or the physical state of matter (or both) are involved and, hence, finds unusually wide application. Heat and mass transfer, fluid mechanics, thermodynamics and chemical reaction kinetics constitute the heart of chemical engineering. Chemical engineers work in many di-
verse fields ranging from production of the many basic chemical products required by our industrial society to research on major technical and social problems, including energy resources development and pollution control.

**UNDERGRADUATE CHEMICAL ENGINEERING OPTION**

To obtain a Bachelor of Science in Engineering Degree with the Chemical Engineering option, students are required to take:

**Semester Hours**

<table>
<thead>
<tr>
<th>Additional Basic Sciences</th>
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</thead>
<tbody>
<tr>
<td>Chemistry - CH 123, 126, 223, 331, 332</td>
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<tr>
<td>Advanced science electives from approved area</td>
</tr>
</tbody>
</table>

**Chemical Engineering Option**

<table>
<thead>
<tr>
<th>Course Details</th>
<th>Semester Hours</th>
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<tbody>
<tr>
<td>ME 198 - Engineering Graphics</td>
<td>2</td>
</tr>
<tr>
<td>CHE 244 - Stoichiometry</td>
<td>3</td>
</tr>
<tr>
<td>ME 341 - Thermodynamics I</td>
<td>3</td>
</tr>
<tr>
<td>CHE 344 - Chemical Engineering Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>ME/CHE 352 - Fluid Mechanics I</td>
<td>3</td>
</tr>
<tr>
<td>ME 396 - Numerical Methods and Computations</td>
<td>2</td>
</tr>
<tr>
<td>CHE 440 - Unit Operations Laboratory</td>
<td>3</td>
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<tr>
<td>ME/CHE 442 - Introduction to Heat and Mass Transfer</td>
<td>4</td>
</tr>
<tr>
<td>CHE 443 - Mass Transfer Operations</td>
<td>3</td>
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<tr>
<td>CHE 445 - Chemical Process Control</td>
<td>3</td>
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<tr>
<td>CHE 447 - Chemical Engineering Design I</td>
<td>3</td>
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<tr>
<td>CHE 448 - Chemical Engineering Design II</td>
<td>3</td>
</tr>
<tr>
<td>CHE 441 - Chemical Kinetics and Reactor Design</td>
<td>3</td>
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</tbody>
</table>

**Students applying for graduation in the Chemical Engineering Option after September 1, 1990 must show evidence of having taken the Fundamentals of Engineering (FE) Examination. The exam is offered by the State of Alabama Board of Registration for Professional Engineers, 750 Washington Ave., Montgomery, AL 36130-1001. Phone: (205) 261-5568. Contact the College of Engineering for further information.**

**Suggested Schedule of Courses for Full-time Chemical Engineering Students**

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
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<tbody>
<tr>
<td>Hu/SS</td>
<td>3 *Hu/SS</td>
<td>3 EE 197</td>
</tr>
<tr>
<td>MA 153</td>
<td>3 MA 154</td>
<td>3 MA 233</td>
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<tr>
<td>CH 121 &amp; 125</td>
<td>4 CH 123 &amp; 126</td>
<td>4 CH 223</td>
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<tr>
<td>ME 198</td>
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<td></td>
<td>12</td>
<td>10</td>
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<tr>
<td>CH 331</td>
<td>3 CH 332</td>
<td>2 CHE 244</td>
</tr>
<tr>
<td>PH 111</td>
<td>4 PH 112</td>
<td>4 EC 239</td>
</tr>
<tr>
<td>MA 251</td>
<td>3 MA 244</td>
<td>3 MA 352</td>
</tr>
<tr>
<td></td>
<td>ME/CHE 271</td>
<td>3 ME/CHE 362</td>
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<td>12</td>
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<tr>
<td>+Sci. Elec.</td>
<td>3 +Sci. Elec.</td>
<td>2 +Sci. Elec.</td>
</tr>
<tr>
<td>ME 341</td>
<td>3 EH 301</td>
<td>3 ME/CHE 442</td>
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<tr>
<td>ME/CHE 294</td>
<td>4 ME/CHE 352</td>
<td>3 CHE 344</td>
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<tr>
<td>ME 396</td>
<td>2 EE 300</td>
<td>3 ISE 321</td>
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<td>12</td>
<td>11</td>
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<tr>
<td>EE 311 &amp; 301</td>
<td>4 CHE 445</td>
<td>3 CHE 440</td>
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<tr>
<td>CHE 443</td>
<td>3 *Hu/SS</td>
<td>3 CHE 448</td>
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<tr>
<td>ME 493</td>
<td>2 AHS 392</td>
<td>3 *Hu/SS</td>
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<tr>
<td>CHE 441</td>
<td>3 CHE 447</td>
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<td>12</td>
<td>12</td>
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</table>

*Hu/SS: 12 hours in humanities/social sciences*
+ Sci. Elective: 7 hours from an approved area of concentration with courses or above the 300 level. Approved areas of concentration include physical chemistry, biochemistry, polymers chemistry, and environmental chemistry.

Undergraduate Chemical Engineering (CHE) Courses

244 Stoichiometry 3 hrs.
Introduction to basic calculations of chemical engineering, emphasizing material and energy balances on physical and chemical processes. Prerequisites: PH 111, CH 123, EE 197.

Structure of matter, basic concepts of phase transformation, mechanical, electrical, magnetic, and thermal properties, and corrosion. Basic properties of metals, plastics, elastomers, and ceramics with emphasis on methods of changing properties. Laboratory included. Typical experiments include microstructure analysis, hardness testing, mechanical-properties testing, equilibrium-phase diagrams, corrosion, creep behavior, and semiconductor analysis. Prerequisite: CH 121, PH 112. Lab fee: Level 7. (Same as ME 294).

344 Chemical Engineering Thermodynamics 3 hrs.
Thermodynamics of phase equilibria, chemical reactions and thermodynamic analysis of chemical processes, with emphasis on topics of special interest to chemical engineers. Prerequisites: CHE 244, ME 341.

352 Fluid Mechanics I 3 hrs.
Properties of fluids and fundamental principles governing fluid motion, including fluid statics, conservation of mass, momentum and energy with applications to pipe, and channel flows of incompressible fluids. Laboratory included. Prerequisites: ME 341, 362, MA 352. Lab Fee: Level 7. (Same as ME 352).

440 Unit Operations Laboratory 3 hrs.
Experimental studies covering topics from reaction kinetics, fluid flow, heat transfer, and chemical thermodynamics with emphasis placed on written and oral laboratory report presentation techniques. Lab fee: Level 6. Prerequisite: CHE 344 or senior standing.

441 Chemical Kinetics and Reactor Design 3 hrs.
Fundamental principles of chemical kinetics and chemical reactor engineering along with the design of both thermal and catalytic reactors. Prerequisites: CHE 344. (Same as CHE 541.)

442 Introduction to Heat and Mass Transfer 4 hrs.
Principles of heat and mass transfer: application of principles to problems in conductive, convective, and radiative-heat transfer, and mass transfer; laminar and turbulent flow processes; boiling and condensation; heat exchangers. One credit hour laboratory included. Prerequisites: ME 341, 352, 396, MA 352. Lab fee: Level 6. (Same as ME 442).

443 Mass Transfer Operations 3 hrs.
Theory of mass transfer phenomena, with applications to both stagewise and diffusion controlled distillation, gas absorption/desorption, humidification and extraction processes. Prerequisites: CHE 344, ME 442.

445 Chemical Process Control 3 hrs.
Fundamental principles of chemical process control; control system design for chemical processes. Lab fee: Level 6. Prerequisites: MA 352, CHE 244.
447 Chemical Engineering Design I 3 hrs.
Component design of individual chemical engineering equipment to include solid/liquid handling, contacting devices and distribution systems. Introductory topics in computer-aided design will be discussed. Lab fee: Level 5. Prerequisites: CHE 443, 445, ME 493.

448 Chemical Engineering Design II 3 hrs.
An overall team design effort, using modern computer-aided design techniques, to perform a preliminary design, simulation and economic evaluation of a chemical production flow sheet. Lab fee: Level 5. Prerequisites: CHE 447, 441.

449 Introduction to Environmental Engineering 3 hrs.
Engineering aspects of air, water, and thermal pollution. Hydrologic cycle, water sources and uses; industrial and other sources of primary and secondary pollutants. Transport process in environmental problems and in their control. Prerequisite: ME/CHE 442. (Same as CHE 549.)

450 Environmental Control 3 hrs.
Engineering design and synthesis of environmental control systems. Control of multiphase systems with application to air and water pollution control. Prerequisite: ME/CHE 442. (Same as CHE 550.)

452 Introduction to Air Pollution 3 hrs.
Technology of air pollution dealing with air pollutants, effects, sources, combustion processes, and abatement and control technology. Engineering contributions to both the problems and their solutions. Nature of air pollution problem and fundamental technological approaches to its solution. Prerequisite: graduate standing. Offered upon demand.

Graduate Chemical Engineering Program
The range of research interest in the Chemical Engineering Faculty is broad. It affords graduate students opportunities for advanced work in transport phenomena, chemical processes, chemical reacting flow processes, reaction engineering, electrochemical systems and material processing. The Master of Science and the Ph.D degrees granted in these areas of concentration are equivalent to those available in a traditional Chemical Engineering program. Support is available at attractive levels for all qualified students including research or teaching assistantships, tuition grants as well as graduate fellowship and Co-op's with federal and industrial research organizations. Please contact the Department for further details.

Admissions Requirements
For unconditional admission to the Chemical Engineering Graduate Programs, a student must hold a Bachelor's Degree from an ABET accredited program, have a grade point average of at least 3.0 and a GRE score of 1500. Outstanding (3.5 GPA) students from other technical fields may gain admittance to CHE by completing certain undergraduate courses.

Graduate Chemical Engineering Courses (CHE)

540 Physical Properties of Fluids 3 hrs.
Theoretical, experimental, and correlation methods for determining and predicting the thermodynamic and transport properties of various fluids. Critical properties, equations of state, vapor pressure and latent heat, heat capacity. Viscosity, thermal conductivity, diffusion coefficient, phase equilibrium, heat and free energy for formation. Prerequisite: CHE 342. Offered upon demand. (Same as ME 540.)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>541</td>
<td>Chemical Kinetics and Reaction Design</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Fundamental principles of chemical kinetics and</td>
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<td></td>
<td>chemical reactor engineering along with the</td>
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<td></td>
<td>design of both thermal and catalytic reactors.</td>
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<td>Prerequisites: CHE 344, 443.</td>
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<td>549</td>
<td>Introduction to Environmental Engineering</td>
<td>3 hrs.</td>
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<td></td>
<td>Engineering aspects of air, water, and thermal</td>
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<td>pollution. Hydrologic cycle, water sources and</td>
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<td>uses; industrial and other sources of primary</td>
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<td>and secondary pollutants. Transport process in</td>
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<td>environmental problems and in their control.</td>
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<td>Prerequisite: CHE 442. (Same as CE 549).</td>
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<td>550</td>
<td>Environmental Control</td>
<td>3 hrs.</td>
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<td></td>
<td>Engineering design and synthesis of environmental</td>
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<td>control systems. Control of multi-phase systems</td>
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<td>with application to air and water pollution</td>
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<td>control. Prerequisite: CHE 442. (Same as CE 450.)</td>
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<tr>
<td>559</td>
<td>Selected topics in CHE</td>
<td>Credit to be arranged</td>
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<tr>
<td>641</td>
<td>Advanced Thermodynamics</td>
<td>3 hrs.</td>
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<td></td>
<td>Application of classical thermodynamics. Treatment</td>
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<td></td>
<td>of problems involving nonideal gases and liquids,</td>
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<td>phase equilibrium, and chemical equilibrium.</td>
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<tr>
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<td>Prerequisite: CHE 342.</td>
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<tr>
<td>644</td>
<td>Introduction to Electrochemical Systems</td>
<td>3 hrs.</td>
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<td>Thermodynamics, transport, and kinetics of</td>
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<td>electrodes and cells. Systems analysis of</td>
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<td>batteries, fuel cells, porous electrodes,</td>
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<td>electroplating, electrowinning, and corrosion</td>
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<td>processes. Convective diffusion at high Schmidt</td>
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<td></td>
<td>numbers. Prerequisites: CHE 443 or equivalent.</td>
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<td></td>
<td>Lab Fee: Level 4.</td>
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<tr>
<td>646</td>
<td>Thermodynamics of Materials</td>
<td>3 hrs.</td>
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<td></td>
<td>Treatment of thermodynamic topics as they apply</td>
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<td>to behaviors observed in metallic and non-</td>
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<td>metallic materials. Prerequisites: Ch 341 or</td>
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<td>equivalent. (Same as CH 646).</td>
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<td>Lab fee: Level 7.</td>
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<td>649</td>
<td>Transport Phenomenon</td>
<td>3 hrs.</td>
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<td>Mass, energy, and momentum transport in steady</td>
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<td>and transient motions in real and rheological</td>
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<td>substances. Prerequisite: CHE 442. (Same as ME</td>
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<td>649).</td>
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<td>652</td>
<td>Introduction to Air Pollution</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Technology of air pollution dealing with air</td>
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<td>pollutants, effects, sources, combustion</td>
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<td>processes, and abatement and control technology.</td>
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<td>Engineering contributions to both the problems</td>
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<td>and their solutions. Nature of air pollution</td>
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<td>problem and fundamental technological approaches</td>
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<td>to its solution. Prerequisite: graduate standing.</td>
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<td></td>
<td>Offered upon demand. (Same as CE 652.)</td>
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<tr>
<td>657</td>
<td>Advanced Process Control</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Application of modern control theory to chemical</td>
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<td></td>
<td>processes; multivariable control; estimation</td>
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<td>and adaptive control, optimal control. Prerequisite: ECE 505.</td>
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<tr>
<td>658</td>
<td>Catalysis and Reactor Design</td>
<td>3 hrs.</td>
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<td>Treatment of homogeneous and heterogeneous</td>
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<td>reaction kinetics, transport in fluid-solid</td>
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<td>reactions, catalyst deactivation and their effects</td>
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<td>on the analysis and design of chemical reactors.</td>
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<tr>
<td></td>
<td>Prerequisite: CHE 541.</td>
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<tr>
<td>659</td>
<td>Selected Topics in Chemical Engineering</td>
<td>Credit to be arranged</td>
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<td></td>
<td>Lab fee: Level 7</td>
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<tr>
<td>699</td>
<td>Master’s Thesis</td>
<td>3 or 6 hrs.</td>
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<td>Required each term in which student is working</td>
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<td>and receiving direction on the Master’s thesis.</td>
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<td>A minimum of two terms and six hours is required</td>
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<tr>
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<td>for M.S.E. students. A maximum of nine hours of</td>
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<td>credit is awarded upon successful completion of</td>
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<tr>
<td></td>
<td>Master’s thesis.</td>
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</tbody>
</table>
749 Mass Transport
Mass transfer in solid and fluid systems under steady and transient conditions. Integration of momentum, heat and mass transfer equations with application to reactive, rheological and multicomponent systems. Lab fee: Level 7. Prerequisite: ME 643 and 651. (Same as ME 749.)

799 Doctoral Dissertation

CIVIL ENGINEERING OPTION

Degrees: Bachelor of Science in Engineering
Master of Science in Engineering
Doctor of Philosophy

Professor Emeritus Kubitz; Professor Gilbert (Director); Associate Professor Schonberg; Assistant Professors Crull, Uber; Lecturers Aston, Pope, Worden.

The six main branches of Civil Engineering are: Structural Engineering, Hydraulic Engineering, Geotechnical Engineering, Environmental Engineering, Transportation Engineering, and Construction Engineering and Management. Civil Engineers in these disciplines are involved in the planning, analysis, and design of various projects, including buildings, bridges, dams, rocket launching platforms, canals, hydroelectric plants, large spacecraft structures, offshore drilling platforms, water treatment and distribution systems, wastewater treatment plants, groundwater quality monitoring and restoration systems, highways, gas and oil pipelines, office complexes, and industrial parks. In their work Civil Engineers use traditional design and analysis approaches as well as advanced experimental and computational techniques.

Research performed by the Civil Engineering faculty emphasizes state-of-the-art technology and is geared largely toward space-based applications. The philosophy and unique qualifications of the faculty afford graduate students opportunities for advanced work in structural engineering, engineering mechanics, environmental engineering, and experimental mechanics/applied optics. Under a cooperative agreement, several courses are co-listed and jointly taught by Civil and Mechanical Engineering faculty so that a variety of courses can be offered on a regular basis. Support is available at attractive levels for qualified students in the form of assistantships and/or tuition grants. Graduate Co-op positions are also available with many local research and industrial organizations. UAH has the intellectual and social environment to provide a well-rounded, technologically-oriented degree, and the Master and Ph.D. degrees granted by the Department are equivalent to those available in traditional Civil Engineering programs.

Undergraduate Civil Engineering Option
To obtain a Bachelor of Science in Engineering, Civil Engineering students are required to take:

Additional Basic Sciences

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 198 - Engineering Graphics</td>
<td>2</td>
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<tr>
<td>ME 341 - Thermodynamics I</td>
<td>3</td>
</tr>
<tr>
<td>ME/CHE 352 - Fluid Mechanics I</td>
<td>3</td>
</tr>
<tr>
<td>ME/CE 370 - Mechanics of Materials</td>
<td>4</td>
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<tr>
<td>ME 396 - Numerical Methods and Computations</td>
<td>2</td>
</tr>
<tr>
<td>CE 325 - CAD Seminar</td>
<td>0</td>
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<tr>
<td>CE 371 - Structural Analysis I</td>
<td>3</td>
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<tr>
<td>CE 372 - Soil Mechanics</td>
<td>4</td>
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</table>

Chemistry - CH 123, 126 .................................................. 4
CE 381 - Structural Analysis II ................................................................. 3
CE 382 - Land Surveying ................................................................. 3
CE 403 - Reinforced Concrete Design ........................................ 3
CE 404 - Structural Design ................................................................. 3
CE 472 - Hydraulic Engineering ......................................................... 3
CE 473 - Transportation Engineering and Design ............................ 3
CE 475 - Hydrology ........................................................................... 2
CE 476 - Water Quality Control Processes ..................................... 3
CE 480 - Civil Engineering Design Project ........................................ 3
*Technical Electives ........................................................................ 6

* Choose from CE 375, 376, 449, 461, 474, 477, 478, 481, 482, 485, ME 342, 378, 394, 442, 451, 454, 470, 485, 486, 489, or other 300 level or above courses approved by the Civil Engineering program director.

Students applying for graduation in the Civil Engineering Option after September 1, 1990 must show evidence of having taken the Fundamentals of Engineering (FE) Examination. The exam is offered by the State of Alabama Board of Registration for Professional Engineers, 750 Washington Ave., Montgomery, AL 36130-1001. Phone: (205) 261-5568. Contact the College of Engineering for further information.

Suggested Schedule of Courses for Full-time Civil Engineering Students

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA 153</td>
<td>3 MA 154</td>
<td>3 MA 233</td>
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<tr>
<td>CH 121 &amp; 125</td>
<td>4 CH 123 &amp; 126</td>
<td>4 PH 112</td>
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<tr>
<td>ME 198</td>
<td>2 PH 111</td>
<td>4 EE 197</td>
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<tr>
<td>*HU/SS</td>
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<th>Winter</th>
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<tbody>
<tr>
<td>MA 251</td>
<td>3 MA 244</td>
<td>3 MA 352</td>
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<tr>
<td>*HU/SS</td>
<td>3 ISE 321</td>
<td>3 ME/CE 271</td>
</tr>
<tr>
<td>EC 239</td>
<td>3 *HU/SS</td>
<td>3 ME/CHE 294</td>
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<tr>
<td>*HU/SS</td>
<td>3 EH 301</td>
<td>3 EH 301</td>
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<table>
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<tr>
<th>Spring</th>
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<tbody>
<tr>
<td>CE 325</td>
<td>0 CE 371</td>
</tr>
<tr>
<td>ME 341</td>
<td>3 ME/CHE 352</td>
</tr>
<tr>
<td>ME/CE 362</td>
<td>3 ME 396</td>
</tr>
<tr>
<td>ME/CE 370</td>
<td>4 EE 300</td>
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<table>
<thead>
<tr>
<th>Winter</th>
<th>Spring</th>
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</thead>
<tbody>
<tr>
<td>CE 382</td>
<td>3 CE 403</td>
<td>3 CE 472</td>
</tr>
<tr>
<td>CE 404</td>
<td>3 CE 473</td>
<td>3 CE 480</td>
</tr>
<tr>
<td>CE 475</td>
<td>2 CE 476</td>
<td>3 AHS 392.</td>
</tr>
<tr>
<td>Tech. Elec.</td>
<td>3 ME 493</td>
<td>2 Tech. Elec.</td>
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<table>
<thead>
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<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
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</thead>
<tbody>
<tr>
<td>CE 382</td>
<td>3 CE 403</td>
<td>3 CE 472</td>
</tr>
<tr>
<td>CE 404</td>
<td>3 CE 473</td>
<td>3 CE 480</td>
</tr>
<tr>
<td>CE 475</td>
<td>2 CE 476</td>
<td>3 AHS 392.</td>
</tr>
<tr>
<td>Tech. Elec.</td>
<td>3 ME 493</td>
<td>2 Tech. Elec.</td>
</tr>
</tbody>
</table>

*Hu/SS: 12 hours in humanities/social sciences

Total hours 133
Undergraduate Civil Engineering (CE) Courses

325 CAD Seminar  
Use of Computer Aided Design (CAD) systems and other appropriate topics. Seminar Course. Satisfactory/Unsatisfactory grading system. Prerequisite: Junior Standing.

362 Dynamics  
Kinematics and kinetics of particle and systems of particles with applications to central force motion, impact, relative motion, vibrations, and variable mass systems. Dynamics of rigid body in plane motion, relative motion in rotating coordinates, and gyroscopic motion. Prerequisite: ME/CE 271 (same as ME 362).

370 Mechanics of Materials  
Topics include: theory of stress and strain. Hooke’s law, analysis of stresses and deformations in bodies loaded by axial, torsional, bending and combined loads, and analysis of statically indeterminate systems. Laboratory includes: the determination of selected properties of various engineering materials, experimental verification of theories presented, use of strain measuring devices, test procedures, instrumentation, and interpretation of results. ME/CE 271, ME/CHE 294 (Same as ME 370).

371 Structural Analysis I  
Reactions, shears, moments in determinate structures. Influence lines, energy methods in computing deformations. Introduction to indeterminate structures. Prerequisites: ME/CE 362, 370.

372 Soil Mechanics  
Index properties and characteristics of soils. Compaction shear, compressibility and permeability. Application to analysis and design of foundation elements. Laboratory included. Lab fee: Level 5. Prerequisites: ME/CHE 352, ME/CE 370.

375 Hydraulics  
Conservation principles of mass, momentum, and energy and their applications to hydraulic problems. Open channel flows, pipe flows and their application to water supplies in sanitary engineering, flow measurements. Prerequisite: ME/CHE 352.

376 Hydraulics Lab  
Experiments on water table, open channels, Venturi meter, Pelton and Francis turbines, data analysis, head loss in pipe flow, and pitot static tubes. Prerequisite: CE 375. Lab fee: Level 5.

380 Engineering Design Project  
Credit to be Arranged Individualized design project under supervision of instructor. Prerequisite: Junior Standing.

381 Structural Analysis II  
Reactions, shears, moments and deformations in complex structural systems. Statically indeterminate systems, advanced geometric and energy methods. Prerequisite: CE 371.

382 Land Surveying  
Use of surveying tools and techniques with application to planimetric and topographic mapping, traverse and area computations, stadia and construction surveys. History and methods of surveying public lands of the United States. Problems in resurveys of public lands. Computer applications. Laboratory work included. Prerequisites: ME 198 or consent of instructor. Lab Fee: Level 3.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>403</td>
<td>Reinforced Concrete Design</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Design of reinforced concrete structures with emphasis on the ultimate strength method. Aspects of prestressed concrete design; computer applications. Prerequisite: CE 371, 381.</td>
<td></td>
</tr>
<tr>
<td>404</td>
<td>Structural Design</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Principles of design of metalstructures. Analysis and design of structural elements including beams, columns, connection details. Prerequisite: CE 371, 381.</td>
<td></td>
</tr>
<tr>
<td>459</td>
<td>Selected Topics in Civil Engineering</td>
<td>Credit to be arranged</td>
</tr>
<tr>
<td>461</td>
<td>Vibrations of Elastic Systems</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Formulation of the equations of motion of discrete and continuous systems, analytical and numerical methods of solution, eigenvalue problems and dynamic response. Prerequisite: ME 488. (Same as CE 561 and ME 461/561).</td>
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</tr>
<tr>
<td>472</td>
<td>Hydraulic Engineering</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Water-hammer analysis; hydraulic structures such as dams, spillways, stilling basins, flood control devices, locks, pipe-flow systems and water-supply facilities. Prerequisite: CE 325, ME/CHE 352.</td>
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</tr>
<tr>
<td>473</td>
<td>Transportation Engineering and Design</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Theory, design, and operation of various modes of transportation. Prerequisites: CE 325, 372, 382.</td>
<td></td>
</tr>
<tr>
<td>474</td>
<td>Applied Mechanics of Solids</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Stresses and strains at a point, theories of failures, stress concentration factors, thick-walled cylinders, torsion of noncircular members, curved beams, unsymmetrical bending and shear center. Prerequisite: ME/CE 370. (Same as CE 574 and ME 474/574).</td>
<td></td>
</tr>
<tr>
<td>475</td>
<td>Hydrology</td>
<td>2 hrs.</td>
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<tr>
<td></td>
<td>Hydrologic cycles, rainfall and runoff analysis, hydrograph analysis, water-shed studies, overland flow and flood routing, sediment transport, hydrologic forecast. Prerequisite: CE 325, ME/CHE 352.</td>
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</tr>
<tr>
<td>476</td>
<td>Water Quality Control Processes</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Experimental methods to determine stress, strain, displacement, velocity, and acceleration in various media. Theory and laboratory applications of electrical resistance strain gages, brittle coatings, and photo-elasticity. Application of tranducers and experimental analysis of engineering systems. Prerequisites: ME/CE 370 and Junior Standing (Same as CE 577 and ME 477/577). Lab fee: Level 7.</td>
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<tr>
<td>478</td>
<td>Matrix Methods in Structural Mechanics</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Matrix application to formulation and solution of linear problems in structural mechanics. Stresses, vibrations, and stability of engineering structures. Prerequisite: CE 381. (Same as CE 578 and ME 478/578).</td>
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</tr>
<tr>
<td>480</td>
<td>Civil Engineering Design Project</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Analysis and design of a complete civil engineering project including establishment of design criteria, cost estimates, specifications, and plans. Prerequisite: Senior Standing.</td>
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<tr>
<td>481</td>
<td>Advanced Soil Mechanics</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Continuum mechanics applied to soil behavior. Theoretical approaches to consolidation, shear strength, slope stability and soil stabilization. Prerequisite: CE 372. (Same as CE 581). Lab Fee: Level 7.</td>
<td></td>
</tr>
</tbody>
</table>
The Graduate Civil Engineering Programs

For unconditional admission to the Civil Engineering graduate programs, a student must hold a bachelor’s degree from an ABET accredited program, have a grade point average of at least 3.0 and a GRE score of 1500. Outstanding (3.5 GPA) students from other technical fields may gain admittance to CE by completing certain undergraduate courses. Please contact the Department for further details.

All M.S.E. students in the Civil Engineering Program are guided through one of two specialized areas of concentration: each area has a core of three required courses. The structures and mechanics area requires CE 671, 672, and 674. The environmental area requires CE 549, 550, and 671. The remainder of the program and elective courses are chosen with the approval of the student’s advisor. M.S.E. students must enroll in the departmental seminar, CE 683 for one term. The Department also offers a program reported as a dissertation. Such work is supervised by an experienced researcher and recognized authority in the field. Course work, written and oral exams, and the dissertation are all essential components of the doctorate. All Ph.D. students must enroll in the departmental seminar, CE 683, for three terms.

Ph.D. students in Civil Engineering must meet the minimum requirements set by the School of Graduate Studies. CE doctoral students must also meet some requirements set by the Department (Contact the chair).

Graduate Civil Engineering Courses (CE)

503 Reinforced Concrete Design 3 hrs.
Design of reinforced concrete structures with emphasis on the ultimate strength method. Aspects of prestressed concrete design: computer applications. Prerequisite: CE 371, 381. (Same as CE 403).

504 Structural Design 3 hrs.
Principles of the design of metal structures. Analysis and design of structural elements including beams, columns, connection details. Prerequisite: CE 371, 381. (Same as CE 404).

549 Introduction to Environmental Engineering 3 hrs.
Engineering aspects of air, water, and thermal pollution. Hydrologic cycle, water sources and uses; industrial and other sources of primary and secondary pollutants. Transport process in environmental problems and in their control. Prerequisite: ME/CHE 442. (Same as CHE 549).

550 Environmental Control 3 hrs.
Engineering design and synthesis of environmental control systems. Control of multiphase systems with application to air and water pollution control. Prerequisite: ME/CHE 442. (Same as CHE 550.)

559 Selected Topics in Civil Engineering Credit to be arranged

561 Vibrations of Elastic Systems 3 hrs.
Formulation of the equations of motion of discrete and continuous systems, analyti-
570 Mechanical Behavior of Engineering Materials 3 hrs.
Structure, properties, and behavior of materials. Structural defects and their influence on mechanical properties, point defects, dislocation and lattice imperfection in crystals, plastic deformation of single crystal and polycrystalline alloys, strengthening mechanisms and fracture. Strain rate, time to failure, and cyclic life from a microscopic view point. Prerequisites: ME/CHE 294, CE 370.

574 Applied Mechanics of Solids 3 hrs.
Stresses and strains at a point, theories of failures, stress concentration factors, thick-walled cylinders, torsion of noncircular members, curved beams, unsymmetrical bending, and shear center. Prerequisite: CE 370. (Same as CE 474 and ME 474/574).

577 Fundamentals of Experimental Mechanics 3 hrs.
Experimental methods to determine stress, strain, displacement, velocity, and acceleration in various media. Theory and laboratory applications of electrical resistance strain gages, brittle coatings, and photoelasticity. Application of transducers and experimental analysis of engineering systems. Prerequisites: CE 370 and junior standing. (Same as CE 477 and ME 477/577). Lab fee: Level 7.

578 Matrix Methods in Structural Mechanics 3 hrs.
Matrix application to formulation and solution of linear problems in structural mechanics. Stresses, vibrations, and stability of engineering structures. Prerequisite: CE 371. (Same as CE 478 and ME 478/578).

581 Advanced Soil Mechanics 3 hrs.
Continuum mechanics applied to soil behavior. Theoretical approaches to consolidation, shear strength, slope stability and soil stabilization. Prerequisite: CE 372. (Same as CE 481.) Lab fee: Level 7.

582 Soil Dynamics 3 hrs.
Behavior of soils under dynamic, earthquake and blast loading. Analysis of foundation vibration and isolation. Prerequisite: CE 372. (Same as CE 482.) Lab fee: Level 7.

585 Foundation Engineering 3 hrs.
Application of principles of soil mechanics to the determination of bearing capacity of spread footings, mats, and pile foundations. Drilled piers and caissons. Methods and techniques of site investigation. Prerequisite: CE 372. (Same as CE 485.) Lab fee: Level 7.

652 Introduction to Air Pollution 3 hrs.
Technology of air pollution dealing with air pollutants, effects, sources, combustion processes, and abatement and control technology. Engineering contributions to both the problems and their solutions. Nature of air pollution problem and fundamental technological approaches to its solution. Prerequisite: Graduate standing. Offered upon demand. (Same as CHE 652.)

659 Selected Topics in Civil Engineering Credit to be arranged

660 Structural Dynamics

671 Continuum Mechanics 3 hrs.
Kinematics and kinetics, various coordinate systems, constitutive equations for continuous media: applications to solids, liquids, and gases. Prerequisites: ME/CHE 352, CE 370. (Same as ME 671).

138
672 Theory of Elasticity  3 hrs.
Formulation of boundary-value problems of classical elasticity. Application to plane
problems, prismatic members, and axisymmetric problems. Introduction to three-di­
imensional problems. Prerequisite: CE 671. (Same as ME 672).

673 Plasticity  3 hrs.
Fundamentals of mechanical behavior of metals and nonmetals for stress states greater
than the yield stress state. Deformation and flow theories. Stress-strain relations and
yield criteria. Solution of boundary value problems with plastic bodies. Limit analy­
sis of structures. Prerequisite: ME 671. (Same as ME 673).

674 Finite Element Analysis I  3 hrs.
Finite element theory, variational methods, weighted residuals. Applications to lin­
erar partial differential equations in continuous media. Solution of boundary value and
initial value problems. Prerequisite: CE 671. (Same as ME 674)

675 Rock Mechanics  4 hrs.
Principles of continuum mechanics applied to the design of structures in rock; tun­
nels, underground structures and foundations. Joint behavior; stresses; analysis of
rock slopes; instrumentation. Prerequisite: CE 372. Lab fee: Level 5.

676 Viscoelasticity  3 hrs.
Mechanical behavior of materials having time-dependent and temperature-depend­
ent material properties. Creep and relaxation phenomena. Elastic-viscoelastic analo­
gies. Formulation of stress-strain laws. Solution of boundary value problems for
viscoelastic bodies. Prerequisite: CE 671. (Same as ME 676).

677 Experimental Stress Analysis  3 hrs.
Conventional methods for experimental stress analysis. Introduction to applied opti­
ts with emphasis on non-destructive, laser-based testing methods, fiber optic record­
ing systems, photoelectronic-numerical data acquisition, and computer aided analy­
sis. Prerequisite: CE 577. (Same as ME 677). Lab fee: Level 7.

678 Mechanics of Composite Materials  3 hrs.
Introduction to composite materials, micro and macromechanical behavior of lam­
inadae; bending, buckling and vibration of laminated plates. Prerequisites: CE 671, 672
(Same as ME 678).

683 Graduate Seminar  (Same as ME 683).
Minimum one-term requirement of M.S.E. students in civil engineering and mini­
mum three-term requirement of Ph.D. students in civil engineering. (Same as ME 683).

699 Master’s Thesis  3 or 6 hrs.
Required each term in which a student is working and receiving direction on a mas­
ter’s thesis. Minimum of two terms and 6 hours required for M.S.E. students. A
maximum of nine hours of credit is awarded upon successful completion of master’s
thesis.

759 Selected Topics in Civil Engineering  Credit to be arranged

762 Wave Motion of Continuous Elastic Bodies  3 hrs.
Elements of stress wave propagation in bounded elastic media. Propagation of elas­
tic waves in infinite and semi-infinite bodies, cylinders, rods and beams. Preretri­
site: CE 660. (Same as ME 762).

765 Random Vibration of Elastic Systems  3 hrs.
Dynamic analysis of elastic systems including the response of complex structures to
random excitations. Typical excitations include random wind, thermal, earthquake,
aerodynamic, and ocean wave phenomena. Probabilistic mechanics methods. Con­
cepts of reliability. Stationary and ergodic processes. Prerequisite: CE 561. (Same
as ME 765).
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tr>
<td>772</td>
<td>Theory of Structural Stability</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>773</td>
<td>Theory of Shells</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Analysis of thin plates and shells, including higher approximations theories and transverse-shear deformations; Illustration of theories by selected problems. Prerequisite: CE 671. (Same as ME 773).</td>
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</tr>
<tr>
<td>774</td>
<td>Finite Element Analysis II</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Advanced topics in finite element analysis: application to nonlinear partial differential equations in continuum mechanics: theoretical studies of convergence and stability of solutions. Prerequisite: CE 674. (Same as ME 774).</td>
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</tr>
<tr>
<td>778</td>
<td>Fracture Mechanics</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Theory of crack propagation, stress intensity factors, mapping techniques, series expansion, asymptotic approximations, field singularities, integral transforms, numerical solutions. Prerequisites: CE 671, 672. (Same as ME 778).</td>
<td></td>
</tr>
<tr>
<td>799</td>
<td>Doctoral Dissertation</td>
<td>3 or 6 hrs.</td>
</tr>
</tbody>
</table>

### Electrical and Computer Engineering

Degrees: Bachelor of Science in Engineering  
Master of Science in Engineering  
Doctor of Philosophy

Professors Audeh, Biggs, Halijak, Jarem, Johnson, Kowell (chair), Padulo, Porter (eminent scholar), Poularikas, Singh; Research Professors Johnson; Associate Professors Abushagur, Ho, Stensby, Stern; Assistant Professors Adhami, Chandra, Hofmann, Katsinis, McCullough, Mirsalehi.

Electrical and computer engineering today is concerned with the broad problem of generating, transmitting, receiving, and processing information and energy. Emphasis in the department is on "information" related areas: Antennas and Microwaves, Communications and Signal Processing, Computer Engineering, Control and System Theory, Electronics, Network Theory, and Solid State Devices. New thrust areas under development include optical engineering and robotics.

The faculty is active in publications and funded research. Support is available at attractive levels in the form of graduate teaching or research assistantships, and graduate Co-op’s with local industrial firms or government agencies.

### Admission Requirements

For unconditional admission to the Electrical and Computer Engineering graduate programs, an electrical engineering bachelor's degree from an ABET accredited program is required, with a grade point average of at least 3.00 and a GRE score of 1500. Outstanding non-EE graduates with bachelor’s degrees in another engineering field, mathematics, computer or natural sciences, may be admitted to the ECE graduate programs if they take additional courses to satisfy certain minimal proficiency requirements in basic electrical engineering subject matter.
Degree Requirements

Like the general graduate school requirements, the MSE has two options: plan I which requires twenty-four of coursework hours plus thesis, or plan II of thirty-three hours plus a technical paper. Under certain conditions students may satisfy the degree requirements by satisfactorily completing thirty-six hours. A comprehensive oral exam is required for all options.

To be admitted to the Ph.D. program, students must pass a written preliminary examination. At the end of the coursework, Ph.D. students must pass a qualifying examination, which includes a written examination of the major and two minors, and a comprehensive oral. Finally, a student must write an acceptable dissertation which must be defended in front of the supervisory committee.

Computer Engineering Option

The Department of Electrical and Computer Engineering offers a four-year program leading to a Bachelor of Science in Engineering degree with an option in Computer Engineering. The purpose of the program is to produce a well-educated individual, a practitioner of engineering design - one who becomes a specialist in the design, analysis and application of computer systems. The student will develop a background in non-engineering areas, such as English, mathematics, basic science and humanities and social sciences. In addition, the student will take the engineering core curriculum and courses from computer science. More importantly, the student will be deeply involved in engineering design and in specialty subjects in computer engineering. The computer engineer is a professional that considers carefully the ethical role of the engineer in dealing with a broad spectrum of commercial, legal, and moral issues. A graduate computer engineer will be involved in a number of technical specialties which include computer architecture, interface design, communications and networking, and software engineering.

Additional Basic Sciences

<table>
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<tr>
<th>Course Name</th>
<th>Semester Hours</th>
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<tr>
<td>General Physics with Calculus III - PH 113</td>
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<tr>
<td>PH 116</td>
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<tr>
<td>Computer Engineering Option</td>
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</tr>
<tr>
<td>CPE 201 Digital Logic Design Lab</td>
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<tr>
<td>EE 202 Introduction to Digital Logic Design</td>
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<tr>
<td>EE 303 Electrical Engineering Laboratory</td>
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<td>EE 305 Electronics Laboratory I</td>
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<tr>
<td>EE 313 Electrical Circuits II</td>
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<tr>
<td>EE 315 Electronics I</td>
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<tr>
<td>ISE 390 Probability and Engineering Statistics I</td>
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</tr>
<tr>
<td>EE 402 Design of Digital Computer</td>
<td>3</td>
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<tr>
<td>EE 429 Microcomputers</td>
<td>3</td>
</tr>
<tr>
<td>CPE 433 Advanced Techniques in Computer Design</td>
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<tr>
<td>CPE 427 Computer Engineering Design I</td>
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<td>CPE 437 Computer Engineering Design II</td>
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<tr>
<td>CPE 447 Computer Engineering Design III</td>
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<tr>
<td>*Engineering Electives</td>
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<tr>
<td>CS 208 Introduction to Computer Science II</td>
<td>3</td>
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<tr>
<td>CS 308 Computer Organization and Assembly Language Programming</td>
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<tr>
<td>CS 390 Unix Programming</td>
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<tr>
<td>CS 317 Data Structure and Algorithm Analysis</td>
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<tr>
<td>CS 424 Introduction to Programming Languages</td>
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<tr>
<td>CS 490 Systems Software</td>
<td>3</td>
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</tbody>
</table>

*Engineering courses at level 300 or above.
Suggested schedule of courses for full-time Computer Engineering students.

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<th>Fall</th>
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<td>HU/SS</td>
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<td>MA 153</td>
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<td>4 EE 197</td>
<td>3 EE 202</td>
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</table>

Total Hours 134

**Undergraduate Computer Engineering (CPE) Course Descriptions**

**201 Digital Logic Design Lab**
1 hr.
Experiments on logic gates, combinational logic circuit design, flipflops, sequential circuit design, counter registers, and shift registers. Lab fee: Level 5. In parallel with EE 202.

**203 Fundamentals of Software Engineering**
3 hrs.
Introduction to structured programming - using Pascal. Search and sort algorithm. Introduction to data structures. Applications to engineering related problems. Prerequisite: EE 197.

**325 Principles of Digital Computer Systems**
3 hrs.
Introduction to minicomputers and microcomputers. Topics include: machine organization and operation; information control and transfer within a machine; date transfer and communication with external devices; computer response time; engineering applications of computers. Lab fee: Level 5. Prerequisite: EE 311.

**335 High Level Languages and Computer Hardware**
2 hrs.
Application of high level languages in interrupt processing, real time clock management, device independent high level input/output operations, device drivers, microprocessor networks. Lab fee: Level 5. Prerequisite: EE 202.
427 Computer Engineering Design I 1 hr.
Senior design project course involving microcomputer based systems. First design course on digital system design. Lab fee: Level 5. Prerequisite: CS 308. Can be taken parallel with EE 402, EE 429.

433 Advanced Techniques in Computer Design 3 hrs.
Study of existing computer structures. Computer organization with emphasis on busing systems, storage systems, and instruction sets. Special purpose architectures, performance models and measures, VLSI influence on architecture. Fault-tolerant computer systems. Prerequisite: EE 427.

437 Computer Engineering Design II 1 hr.
Senior design project course involving microcomputer based systems. Second design course on digital system design. Lab fee: Level 5. Prerequisite: EE 427.

447 Computer Engineering Design III 1 hr.
Senior design project course involving microcomputer based systems. Third design course on digital system design. Lab fee: Level 5. Prerequisite: EE 437.

Graduate Computer Engineering (CPE)

629 Advanced Microcomputer Techniques 3 hrs.
Advanced hardware interfacing techniques, complex interfaces (disks), direct memory access, memory design and management, cache memory, fault tolerance issues, parallel processing, with emphasis on hardware issues, neural networks. Prerequisites: EE 429/509. Lab fee: Level 3.

Electrical Engineering Option.
The electrical engineering option offers a background that enables a student to pursue careers in any of the many and diverse facets of electrical engineering such as electronics, network, power systems, instrumentation, computers, communications, and controls. The student may also select advanced undergraduate courses to develop individual and specific interests.

Semester Hours

General Physics with Calculus III - PH 113 ................................................................. 3
PH 116 .................................................. 1

Electrical Engineering Option

EE 202 - Introduction to Logic Design ................................................................. 3
ME 396 - Numerical Methods and Computation .................................................. 2
EE 313 and 303 - Electrical Circuits II and Lab ............................................... 4
EE 315 and 305 - Electronics I and Lab ............................................................... 4
EE 307 - Electricity and Magnetism ................................................................. 3
ME 341 - Thermodynamics I ................................................................. 3
EE 382 - Analytical Methods for Continuous Time Systems .................................. 3
EE 383 - Analytical Methods for Multivariable and Discrete Time ....................... 3
ISE 390 - Probability and Engineering Statistics I ............................................. 3
EE 425 - Introduction to Control and Robotic Systems ...................................... 3
Electrical Engineering Electives* ................................................................. 15
*Technical Electives ................................................................. 3

Technical course at level 300 or above.
## Suggested Schedule of Courses for Full-time Electrical Engineering Students

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<th>Fall</th>
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<td>Hu/SS</td>
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<td>MA 153</td>
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<td>Total 129</td>
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</table>

*Hu/SS: 12 hours in humanities/social sciences.

## Electrical Engineering (EE)

197 Computer Methods in Engineering  
3 hrs.  
Solution of engineering problems using a digital computer. Hardware structure of the stored-program computer; machine language programming; engineering approximation of dynamic systems; flowcharting and algorithms. Practice in solving engineering problems on the university computer using FORTRAN. Lab fee: Level 6. Prerequisite: MA 121.

199 Computer Graphics  
1 hr.  
Principles of Computer Graphics; basic techniques, transforms in two and three dimensional space, perspective, hidden line removal. Includes hands-on experience with a color graphics system. Lab fee: Level 5. Prerequisites: a course in FORTRAN or BASIC and MA 153.

202 Introduction to Digital Logic Design  
3 hrs.  
Engineering approaches to design and analysis of digital logic circuits. Boolean algebra, Karnaugh maps, design using MSI and LSI components, algorithmic state and machine design of sequential circuits. Prerequisite: EE 197.

300 Electrical Circuits I  
3 hrs.  
Electric circuit concepts; transient and steady-state solution of simple circuits. Phasor analysis of ac circuits and network theorems. Prerequisite: PH 112. Prerequisite or parallel: MA 352.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>301</td>
<td>Electronic Instrumentation Laboratory</td>
<td>1 hr.</td>
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<tr>
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<td>Experiments related to elementary electronic instrumentation, solid state semiconductor devices, amplifying circuits, and experiments using analog computer. Must parallel or follow EE 311. Lab fee: Level 5.</td>
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<tr>
<td>303</td>
<td>Electrical Engineering Laboratory</td>
<td>1 hr.</td>
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<td></td>
<td>Experiments related to electrical circuits and to apply and verify principles presented in EE 313. Lab fee: Level 5. Prerequisite EE 301. Must follow or parallel EE 313.</td>
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<tr>
<td>305</td>
<td>Electronics Laboratory I</td>
<td>1 hr.</td>
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<td></td>
<td>Experiments and reports related to amplifiers using bipolar JFET, MOSFET devices. Original design of individual circuits. Lab fee: Level 5. Prerequisite: EE 301 and must follow or parallel EE 315.</td>
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<tr>
<td>307</td>
<td>Electricity and Magnetism</td>
<td>3 hrs.</td>
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<td></td>
<td>Basic concepts of electrostatics, electric potential theory, electric fields and currents, fields of moving charge including relativistic treatment, magnetic fields, Maxwell's equations. Prerequisite: EE 300.</td>
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<td></td>
<td>Basic physical processes occurring in solids. Crystal structure of solids, Schrödinger equation and its applications, free electron model of metals, band theory of solids, and physics of semiconductor devices. Prerequisite: PH 113, ME/CHE 294, and MA 352 or parallel.</td>
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<tr>
<td>311</td>
<td>Electronic Instrumentation</td>
<td>3 hrs.</td>
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<td>Ammeters, voltmeters, and bridges. Transducers, diode and transistor models, operational amplifiers, simple digital and analog instrumentation, introduction to analog computers. Prerequisites: EE 300.</td>
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<tr>
<td>313</td>
<td>Electrical Circuits II</td>
<td>3 hrs.</td>
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<td>Steady-state response to sinusoidal driving functions, polyphase circuits, transfer functions, resonance, magnetically coupled circuits; basic concepts of network topology and analysis, matrix formulation of network equations, algorithms. Prerequisite: EE 300.</td>
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<tr>
<td>315</td>
<td>Electronics I</td>
<td>3 hrs.</td>
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<td></td>
<td>Analysis of large and small signal electronic devices; piece-wise linear models of bipolar and FET devices; amplifiers and their frequency response, power supplies, and special circuit applications, computer simulation. Prerequisites: EE 311, 313.</td>
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<tr>
<td>382</td>
<td>Analytical Methods for Continuous Time Systems</td>
<td>3 hrs.</td>
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<tr>
<td>383</td>
<td>Analytical Methods for Multivariable and Discrete Time Systems</td>
<td>3 hrs.</td>
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<td></td>
<td>Discrete time signals and systems, sampling techniques, Z and discrete Fourier transforms, multivariable systems. Introduction to digital signal processing. Prerequisite: EE 382.</td>
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<tr>
<td>402</td>
<td>Design of Digital Computer</td>
<td>3 hrs.</td>
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<td>Functional organization of stored-program digital computers including number representation, computer hardware, micro-operations, and control logic; microprocessor architecture. Prerequisites: EE 202, 315.</td>
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<td>404</td>
<td>Electrical Networks Laboratory</td>
<td>1 hr.</td>
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<td>Experiments that apply and verify principles presented in EE 382 and 414. Lab fee: Level 5. Prerequisite or parallel: EE 414.</td>
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<tr>
<td>406</td>
<td>Electronics Laboratory II</td>
<td>1 hr.</td>
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</tbody>
</table>
Experiments and reports related to electronic devices such as oscillators, multi-stage amplifiers, modulation and switching circuits. Integrated circuits and microelectronics methods. Lab fee: Level 5. Prerequisite: EE 305 and must parallel EE 416.

407 Electromagnetic waves 3 hrs.
Review of Maxwell’s Equations, uniform plane waves in different types of media, reflection and transmission of uniform plane waves, transmission lines, waveguides, antennas. Prerequisite EE 307 and 313.

410 Selected Topics in Electrical Engineering Credit to be arranged

411 Electric Power System 3 hrs.
Power generation, transmission, and distribution. Three-phase circuits and per unit analysis, load-flow studies, symmetrical components, and power systems stability. Prerequisite: EE 313.

412 Senior Design Project in Electrical Engineering Credits to be arranged
Continuation of ME 493 leading to design of an engineering system. Lab fee: Level 4. Prerequisites: ME 493, senior standing, and permission of instructor.

414 Passive Electrical Networks 3 hrs.
Driving point and transfer functions, frequency response of network, filter theory, and approximation for idealized network characteristics. Prerequisite: EE 313.

416 Electronics II 3 hrs.
Integrated circuits and microdevices related to multistage amplifiers, oscillators, design specifications, operational amplifiers, and microcircuits. Computer Simulation. Prerequisites: EE 313, and 315.

420 Random Signals and Noise 3 hrs.
Random variables and probabilistic description of signals. Introduction to random processes: autocorrelations, crosscorrelations, power spectral density. Noise analysis: thermal, shot, white, colored. Response of electrical systems to random inputs. Prerequisites: EE 382 (Same as EE 500.)

421 Electric Machines 3 hrs.
Direct and alternating current machines equivalent circuits and models, efficiency, input requirements and output characteristics, applications; graphical and mathematical aspects of electrical machines. Prerequisite: EE 313. (Same as EE 501.)

422 Advanced Logic Circuits 3 hrs.
Boolean algebra; the n-cube, star array, Karnaugh arrays; one-to-one transformations, partial transformations, DON’T CARES; symmetric switching function synthesis and reduction with applications to multiple input adders; generator theory of flip-flops and stability condition; serial arithmetic and the binary comparator. Prerequisite EE 202. (Same as EE 502.)

424 Instrumentation 3 hrs.
Measurement techniques and conventional and electronic instruments. Construction, theory of operation, and proper use of bridge circuits, oscilloscope transducers, and digital instruments. Prerequisite: EE 315. (Same as EE 504.)

425 Introduction to Control and Robotic Systems 3 hrs.
The basic theories and analytical techniques for modeling, analysis and control of dynamical systems. Transfer functions, block-diagrams, frequency response, stability criteria, series and feedback controller design, digital control. Introduction to the dynamic analysis and control of robotic systems. Prerequisite: EE 382 or permission of Instructor. (Same as EE 505.)

426 Communication Theory 3 hrs.
Transmission of information including effects of networks, modulation systems, noise, and use of statistics in analysis of information transmission. Prerequisite: EE 420. ISE 390. (Same as EE 506.)
Microcomputers 3 hrs.
The microcomputer as a component in digital design. Laboratory experience in interfacing and design projects. Lab fee: Level 5. Prerequisites; EE 202 and 315; EE 436 recommended. (Same as EE 509.)

Computer Simulation of Dynamic Systems 3 hrs.
Techniques for analyzing the behavior of dynamic systems and processes using analog and digital computer simulation procedures. Emphasis on modern digital simulation techniques, including digital simulation languages. Review of modeling and model simplification techniques for lumped-parameter and continuum dynamic systems. Laboratory demonstrations and exercises. Prerequisite: EE 383 Lab Fee: Level 5. (Same as EE 513.)

Digital Electronics 3 hrs.
Electronic devices. Integrated-circuit logic families (DTL, TTL, etc.) and their design theory. MOSFET circuits and their design theory. Flip-flop, registers and counters. Arithmetic operations. Semi-conductor memories. Analog switches. Analog-to-digital conversion. Prerequisites: EE 202 and 315. (Same as EE 516.)

Digital Electronics Laboratory 1 hr.
Experiments and reports related to logic circuit realization of digital hardware. RTL, DI, TT, ECI families for combinational and sequential switching circuits. Lab fee: Level 6. Must parallel EE 436. (Same as EE 519.)

Optical Systems Design 3 hrs.
Introduction to the geometrical design and analysis of optical systems, and to the design principles of lens systems. Prerequisite: EE 461 or equivalent. Lab fee: Level 7. (Same as EE 532.)

Optics I 3 hrs.
Review of basic optics; Electromagnetic waves; Huygen’s principle; Fresnel’s laws, geometrical optics, optical systems; polarization and optical fibers. Prerequisite: EE 307. (Same as EE 541.)

Optics II 3 hrs.
Physical optics, and Electro-optics. Interference, Michelson & Fabry-Perot interferometers; optical fiber gyros and sensors; Fraunhofer and Fresnel diffraction; coherence theory; light sources, lasers; optical detection & modulation. Prerequisite: EE 461 (Same as EE 542.)

Graduate Courses (EE)
Courses at the 500 level are taken by seniors and first year graduate students. Up to 12 hours of 500 level courses may count towards a graduate degree with prior approval by the program committee. Courses at the 600 and 700 level are open only to graduate students.

Random Signals and Noise 3 hrs.
Random variables and probabilistic description of signals. Introduction to random processes: autocorrelations, cross correlations, power spectral density. Noise analysis: thermal, shot, white, colored. Response of electrical systems to random inputs. Prerequisite: EE 382 (Same as EE 420).

Electric Machines 3 hrs.
Direct and alternating current machines equivalent circuits and models, efficiency, input requirements and output characteristics, applications; graphical and mathematical aspects of electrical machines. Prerequisite: EE 313.
502 Advanced Logic Circuits 3 hrs.
Boolean algebra; the n-cube, star array, Karnaugh arrays; one-toone transformations, partial transformations, DON'T-CARES; symmetric switching function synthesis and reduction with applications to multiple input adders; generator theory of flipflops and stability condition; serial arithmetic and the binary comparator. Prerequisite: EE 202.

504 Instrumentation 3 hrs.
Measurement techniques and conventional and electronic instruments. Construction, theory of operation, and proper use of bridge circuits, oscilloscopes, transducers, and digital instruments. Prerequisite: EE 315.

505 Introduction to Control and Robotic Systems 3 hrs.
The basic theories and analytical techniques for modeling, analysis and control of dynamical systems. Transfer functions, block-diagrams, frequency response, stability criteria, series and feedback controller design, digital control. Introduction to the dynamic analysis and control of robotic systems. Prerequisite: EE 382 or permission of instructor. (Same as EE 425.)

506 Communication Theory 3 hrs.
Transmission of information including effects of networks, modulation systems, noise, and use of statistics in analysis of information transmission. Prerequisite: EE 500.

509 Microcomputers 3 hrs.
The microcomputer as a component in digital design. Laboratory experience in interfacing and design projects. Prerequisites: EE 202 and 315; EE 516 recommended. Lab Fee: Level 5.

510 Selected Topics in Electrical Engineering Credit to be arranged

512 Advanced Senior Design Project in Electrical Engineering 3 hrs.
Individual design project under the direction of an EE faculty member. Prerequisite: Senior standing. Lab Fee: Level 3.

513 Computer Simulation of Dynamic Systems 3 hrs.
Techniques for analyzing the behavior of dynamic systems and processes using analog and digital computer simulation procedures. Emphasis on modern digital simulation techniques, including digital simulation languages. Review of modeling and model simplification techniques for lumped-parameter and continuum dynamic systems. Laboratory demonstrations and exercises. Prerequisites: EE 382/383. Lab Fee: Level 3. (Same as EE 433.)

516 Digital Electronics 3 hrs.

519 Digital Electronics Laboratory 1 hr.
Experiments and reports related to logic circuit realization of digital hardware. RTL, DI, TT, ECI families for combinational and sequential switching circuits. Lab fee: Level 6. Must parallel EE 516.

532 Optical Systems Design 3 hrs.
Introduction to the geometrical design and analysis of optical systems, and to the design principles of lens systems. Prerequisite: EE 541 or equivalent. Lab Fee: Level 5. (Same as EE 452.)

541 Optics I 3 hrs.
Review of basic optics; Electromagnetic waves; Huygen's principle; Fresnel’s laws, geometrical optics, optical systems; polarization and optical fibers. Prerequisite: EE 307. (Same as PH 541 and EE 461.)
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
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<tbody>
<tr>
<td>542</td>
<td>Optics II</td>
<td>3 hrs.</td>
<td>Physical optics, and Electro-optics. Interference, Michelson &amp; Febry-Perot interferometers; optical fiber gyros and sensors; Fraunhofer and Fresnel diffraction; coherence theory; light sources, lasers, optical detection and modulation. (Same as PH 542 and EE 462). Prerequisite: EE 541.</td>
</tr>
<tr>
<td>600</td>
<td>Bit-Slice Design</td>
<td>3 hrs.</td>
<td>Theoretical and practical aspects of computer hardware design using AMD 2900 family bit-slice components. Prerequisite: EE 509. Lab Fee: Level 5.</td>
</tr>
<tr>
<td>601</td>
<td>Linear Systems</td>
<td>3 hrs.</td>
<td>Formulation and solution by transform methods of differential equations of linear electrical and electromechanical systems, state equations, signal-flow graphs, and discrete-time systems. Prerequisite: Graduate standing.</td>
</tr>
<tr>
<td>603</td>
<td>Computer Methods in Power Systems</td>
<td>3 hrs.</td>
<td>System modeling and matrix analysis of three-phase power networks. Application of numerical methods and computers to solution of problems related to planning, design, and operation of electric-power systems. Prerequisites: EE 411 and 501.</td>
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<tr>
<td>605</td>
<td>Control System Design</td>
<td>3 hrs.</td>
<td>Control system synthesis by means of feedback, feedforward, minor loop, and cascade techniques. System designs by analog simulation. Laboratory sessions. Prerequisite: EE 505. Lab Fee: Level 5.</td>
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<tr>
<td>607</td>
<td>Robotic Systems Control</td>
<td>3 hrs.</td>
<td>An in-depth study of information, decision and control problems associated with robotic system design. Sensor systems, recognition and decision algorithms, kinematics and dynamics, trajectory planning, analog and digital controllers, adaptive and optimal control. Prerequisite: EE 425/505.</td>
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<tr>
<td>609</td>
<td>Electromagnetic Field Theory II</td>
<td>3 hrs.</td>
<td>Continuation of EE 608. Prerequisite: EE 608.</td>
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<tr>
<td>610</td>
<td>Selected Topics in Electrical Engineering</td>
<td>Credit</td>
<td>Credit to be arranged.</td>
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611 Signal Analysis 3 hrs.
Advanced analysis methods for continuous and discrete signals and systems, properties of band-limited and time-limited signals, theory and use of generalized Fourier series using prolate spheroidal functions, ambiguity functions and Hilbert, Mellin and Z transforms. Prerequisites: EE 425/505 and EE 426/506.

612 Graduate Design Project 3 hrs.
Graduate design project in support of an MSE program. Prerequisite: approval by MSE committee. Lab Fee: Level 5.

613 Laser Electronics 3 hrs.

614 Linear Graphs and Electrical Networks 3 hrs.

615 Active Networks Synthesis 3 hrs.
Properties and synthesis of RC and LC networks, active network elements, RC active filter design, network sensitivity analysis, realization methods, approximation theory, and filter design. Prerequisite: EE 414.

616 Microelectronic Devices and Integrated Circuits 3 hrs.

617 Very Large Scale Integration Devices 3 hrs.
Discussion of MOSFET characteristics. Second-order considerations for a MOSFET, Computer modeling, VLSI device fundamentals, and scaling laws. Micron-length and submicronlength semiconductor devices. Gallium arsenide (GaAs) digital integrated circuits for ultra-high speed VLSI. Basic technology and applications of VLSI. Impact of VLSI on computer architectures. VLSI computer aided design. Prerequisite: EE 616 or equivalent.

618 Very Large Scale Integrated (VLSI) Circuits 3 hrs.
The VLSI design route; MOS device electronics; MOS processing and design rules; circuit design with MOS; MOS circuit technique; clocks and communication; circuit techniques for array structures; system design styles and chip engineering; computer aids to design. Prerequisite: EE 516 or equivalent. Lab Fee: Level 5.

619 Introduction to Radar Systems 3 hrs.
Topics include radar equation, CW radar, MTI and pulse doppler radar, tracking radar, major systems components, detection in the presence of noise and clutter, ambiguity, and resolution. Prerequisite: EE 606 or equivalent.

623 Design of Knowledge Based Systems 3 hrs.
Introduction to the engineering methods pertinent to the application of expert systems to engineering problem solving. Knowledge representation and engineering knowledge modeling, system architecture and control knowledge, user interfacing, knowledge acquisition, and survey of commercial tools and shells for Electrical and Computer Engineering Applications. Exposure to symbolic (LISB) and object-oriented programming techniques. Prerequisites: EE 505 or EE 513. Lab Fee: Level 3.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>631</td>
<td>Detection of Optical and Infrared Radiation</td>
<td>3</td>
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<tr>
<td></td>
<td>Thermal radiation and electromagnetic modes; ideal photon detector; coherent detection; amplifier noise and its effect on detector performance; noise and efficiency of semiconductor devices; thermal detection; detection statistics. Prerequisite: EE 506 or equivalent. Lab Fee: Level 7.</td>
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<tr>
<td>632</td>
<td>Coherent Optical Systems and Holography</td>
<td>3</td>
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<td></td>
<td>Introducing the optical system as an invariant linear system, Sommerfeld's diffraction integral, propagation of Gaussian beams, coherence theory, frequency analysis of the optical imaging systems, image formation using coherent and incoherent light, on-axis and off-axis holography, and non-destructive testing using Fourier optics and holographic techniques. Prerequisite: EE 542 or equivalent. Lab Fee: Level 7.</td>
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<tr>
<td>633</td>
<td>Electro-Optical Engineering</td>
<td>3</td>
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<td></td>
<td>Propagation of optical beams in homogeneous and guiding media, optical resonators, and spectrum analyzers, theory of laser oscillation, some specific laser systems, parametric oscillators, electro-optical and acousto-optical modulators. Prerequisite: EE 541 or equivalent.</td>
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<tr>
<td>634</td>
<td>Optical Communications</td>
<td>3</td>
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<td></td>
<td>Optical communication systems; counting statistics; the optical detector response process; direct detection; heterodyne detection parameter estimation in optical communications; pointing, spatial acquisition and tracking. Prerequisite: EE 506 or equivalent. Lab Fee: Level 7.</td>
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<tr>
<td>635</td>
<td>Fiber Optics</td>
<td>3</td>
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<td></td>
<td>Propagation in dielectric slab and fibers with step and graded index of refraction; electromagnetic and ray optical methods; eikonal equations; ray trajectory; WKB method; paraxial approximation; weakly guiding structures. Prerequisites: EE 608, 609 or a graduate level EM Theory course. Lab Fee: Level 7.</td>
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<tr>
<td>642</td>
<td>Data and Digital Communications</td>
<td>3</td>
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<td></td>
<td>Introduction to digital and data communications; transmission channels; modulation and coding; telephone networks; data communication standards; noise and distortion; computer interfacing; protocols. Prerequisite: EE 506, 509. Lab Fee: Level 7.</td>
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<tr>
<td>645</td>
<td>Modulation and Phase Locked Techniques in Communi cation</td>
<td>3</td>
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<tr>
<td>649</td>
<td>Neural Networks and Their Applications</td>
<td>3</td>
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<td>Elements of threshold logic and discriminant functions, patterns Classification and general mappings with feedforward networks, training Algorithms and self-organization, Hopfield model and Boltzman machine Computations by energy minimization. Selected Topics. Prerequisites: EE 604 or equivalent.</td>
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<tr>
<td>699</td>
<td>Master's Thesis</td>
<td>3 or 6</td>
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<td>Required each term student is working and receiving direction on his master's thesis. Minimum of two terms and 6 hours required for MSE students. A maximum of nine hours of credit is awarded upon successful completion of master's thesis.</td>
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<tr>
<td>700</td>
<td>Sampled Data Control Systems</td>
<td>3</td>
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<td>Classical and modern methods for analysis and design of sampled data-control systems; Z-transforms, transport lags, z and w plane analysis, state variables, and the transition matrix. Prerequisite: EE 701.</td>
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<tr>
<td>701</td>
<td>Advanced Linear Control Theory</td>
<td>3</td>
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</tbody>
</table>
|            | Modern techniques for analysis and design of linear control systems. Matrix formulation, multivariable control systems, state variable concepts. Linear transformation,
controllability, observability, discrete-time systems. Prerequisite: EE 605 or permission of instructor.

702 Theory of Automata 3 hrs.
Linear automata, efficient and inefficient coders analyzed with Z-transforms and cyclotomic polynomials. State description of autonomous automata. Multilinear automata and various machines. Prerequisite: EE 602.

703 Disturbance-Accommodating Control 3 hrs.
The theory and application of disturbance-accommodating control. Topics covered include the nature of disturbances in control problems; mathematical modeling of uncertain disturbances, modes of disturbance-accommodation, real-time disturbance observers, design of disturbance-accommodating feedback/ feedforward control laws, adaptive control for internal disturbances; case-studies in disturbance-accommodation. Prerequisite: EE 701.

704 Nonlinear Control Systems 3 hrs.
Classical and modern methods for analysis and design of nonlinear automatic control systems. State variables, phase plane, limit cycles, stability, describing functions, relay control, stabilization theory. Prerequisite: EE 701.

705 Theory of Optimal Control 3 hrs.
General theory of optimal control of dynamic processes. Calculus of variations. Hamilton-Jacobi theory. Pontryagin's maximum principle, dynamic programming. Prerequisite: EE 701 or approval of instructor.

706 Stochastic Control Theory 3 hrs.
The analysis and control of dynamical processes subject to random inputs, noisy measurements and uncertain parameter variations. Topics studied include the mathematical theory of random processes, linear operations on random processes, Wiener and Kalman filtering theories, the LQG control problem, the Separation Principle, the identification problem. Prerequisite: EE 701.

707 Information Theory 3 hrs.
Self-information, entropy, mutual information, and channel capacity, encoding, error detecting and correcting codes. Sampling theorem. Discrete and continuous channels. Prerequisite: EE 506.

708 Digital Signal Processing 3 hrs.
Theory and applications of signal processing by digital techniques. Difference equations, Z-transform theory, digital-filter design, fast Fourier transform, quantization effects, and discrete estimation. Applications in digital filtering, signal processing, data analysis and smoothing, and image processing. Prerequisite: EE 606 or 614 or 605 or 602.

710 Selected Topics in Electrical Engineering Credit to be arranged.

711 Antenna Theory 3 hrs.
Antennas and antenna arrays. Radiation patterns and impedance characteristics. Spheres, cylinders, horns, slots, microwave lenses, traveling-wave, and frequency independent antennas. Prerequisite: EE 608.

715 Digital Filters with Switched Capacitors 3 hrs.
Finite Time Laplace Transforms describe the reverse-switched and switched capacitors as current-voltage elements. Discretizations or resistors in RC passive and active networks. Realization of inductors and supercapacitors with operational amplifiers enables discretization of RLC filters. Prerequisite: EE 615.

716 Device Modeling for Integrated Circuit Design 3 hrs.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>717</td>
<td>Space Applications of Electromagnetics</td>
<td>3 hrs.</td>
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<tr>
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<td>Plasma as a dielectric; dielectric functions for</td>
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<td></td>
<td>cold, warm, isotropic and anisotropic plasmas,</td>
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<td></td>
<td>body-plasma interaction; space craft electromag-</td>
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<td></td>
<td>dynics, antennas in plasmas; mode of radiation,</td>
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<td></td>
<td>input impedance and radiation pattern, scattering</td>
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<td></td>
<td>problems involving plasmas. Prerequisites: EE 608</td>
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<td></td>
<td>or ME/PH 531 or permission of instructor.</td>
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<tr>
<td>718</td>
<td>Microwave Techniques</td>
<td>3 hrs.</td>
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<td>Network representations and analysis of microwave</td>
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<td>devices. Discontinuities from a circuit point of</td>
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<td>view. Symmetry consideration. Scattering matrices</td>
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<td>in circuit design. Cavity resonators. Prerequisite:</td>
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<td>EE 609.</td>
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<tr>
<td>719</td>
<td>Advanced Electromagnetic Field Theory</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Classical theory of electricity and magnetism.</td>
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<td>Potential theory, time-varying fields, boundary</td>
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<td>value problems, stresses, theory of relativity.</td>
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<td>Prerequisite: EE 609.</td>
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<tr>
<td>720</td>
<td>Computer-Aided Design of Control Systems</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Application of computer-sided design techniques</td>
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<td>to problems of analysis and control design for</td>
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<td>single-input and multi-input dynamic systems.</td>
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<td>Canonical decompositions, eigen structure</td>
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<td>assignment out put feedback design, Kalman filters,</td>
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<td>full and reduced-order observer design, LQR and</td>
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<td>DAC design. Prerequisite: EE 701.</td>
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<tr>
<td>721</td>
<td>Control Engineering for Large-Scale Systems</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Time-domain and frequency-domain modeling; control</td>
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<td>engineering techniques for multilevel (hierarch-</td>
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<td></td>
<td>ical) control of large scale systems; system</td>
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<td>aggregation, decomposition; decentralized control;</td>
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<td>robust and stochastic control; structural control</td>
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<td>problems; effects of unmodeled dynamics. Prerequi-</td>
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<td></td>
<td>site: EE 701.</td>
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<tr>
<td>722</td>
<td>Adaptive and Self-Organizing Control</td>
<td>3 hrs.</td>
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<td></td>
<td>Adaptive and self-organizing control techniques</td>
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<td>for deterministic and stochastic systems includ-</td>
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<td>ing model reference adaptive control; adaptive</td>
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<td>observers and optimal state estimation; on-line</td>
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<td>parameter identification; parameter adaptive and</td>
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<td>performance-adaptive controllers; stability of</td>
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<td>adaptive algorithms; introduction to learning</td>
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<td></td>
<td>control systems. Prerequisite: EE 701.</td>
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<tr>
<td>725</td>
<td>Advanced Radar Techniques</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Modern radar systems for search and tracking are</td>
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<td>analyzed with emphasis on signal processing.</td>
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<td>Modeling and simulation of system and environment</td>
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<td>are discussed. Advanced techniques include CFAR,</td>
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<td></td>
<td>binary modulation, frequency agility, polariza-</td>
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<td>tion agility, and synthetic aperture. Prerequi-</td>
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<tr>
<td></td>
<td>site: EE 619 or equivalent. Lab Fee: Level 7.</td>
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<tr>
<td>726</td>
<td>Decision and Estimation Theory</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Classical detection theory, including maximum</td>
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<tr>
<td></td>
<td>likelihood, Neyman-Pearson, Bayes and minimax</td>
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<tr>
<td></td>
<td>criteria. Estimation theory concepts and criteria,</td>
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<td></td>
<td>linear estimators, Kalman filters, maximum</td>
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<td></td>
<td>likelihood and least-squares estimator, matched</td>
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<td></td>
<td>filters, Cramer-Rao lower bound. Introduction to</td>
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<td>pattern recognition. Prerequisite: EE 606 or equi-</td>
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<td>valent.</td>
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<tr>
<td>727</td>
<td>Numerical Methods in Electromagnetics</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Review of concepts in electromagnetics, antennas</td>
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<td>and scattering problems, method of moments and</td>
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<td>applications, finite difference and finite ele-</td>
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<td>ment methods, numerical solutions of transient</td>
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<tr>
<td></td>
<td>problems associated with broadband systems, impul-</td>
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</tr>
</tbody>
</table>

153
response, direct solution of field equations in time domain. Prerequisite: EE 609.

735 Statistical Optics 3 hrs.
Introduction to random variables and random processes; first-order properties of light waves; coherence of optical waves, partial coherence and imaging systems, imaging in randomly inhomogeneous media, fundamental limits in photodetector detection of light. Prerequisite: EE 506. Lab Fee: Level 7.

737 Channel Characterization and Communication in Random Media 3 hrs.
Modeling stationary and not strictly stationary random media; scatter communications channels; line of sight communication channels — weak scattering and strong scattering. Prerequisites: EE 506 and 608 or equivalent. Lab Fee: Level 7.

738 Optical Transforms and Pattern Recognition 3 hrs.
Systems and transforms in diffraction theory; two-dimensional Fourier transform; Hankel transforms; generalized Hankel transforms; optical signals, correlation coherence; filtering; apodization; applications to optical pattern recognition. Prerequisite: EE 632 or equivalent. Lab Fee: Level 7.

744 Digital Communication and Spread Spectrum 3 hrs.

747 Random Fields, Image Processing and Pattern Recognition 3 hrs.
Fundamental analysis of random fields; second-order analysis of homogeneous random fields; spectral parameters, level average processes; image restoration; texture analysis and pattern recognition; parameter estimation in space-time domain. Prerequisite: EE 641 or equivalent. Lab Fee: Level 7.

799 Doctoral Dissertation 3-6 hrs.

Industrial and Systems Engineering
Degrees: Bachelor of Science in Engineering
Master of Science in Engineering
Master of Science in Operations Research
Doctor of Philosophy
Professors Brown, Schrorer (acting chair), Wyskida; Associate Professors Lovett, Tytula, Walker; Adjunct Associate Professors Dorsett, Walker; Assistant Professor Messimer; Adjunct Assistant Professors Lawler, Safie.

Industrial and Systems Engineering Option
Industrial and systems engineering is concerned primarily with integration of people, machines and materials and operating procedures into a functional and economic whole called a system. Thus the specialization includes consideration not only of the usual engineering science, but also requires some knowledge of social, psychological, and human values to identify and satisfy needs of ultimate users of engineering systems.

Additional Basic Sciences
Industrial Engineering Option

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 198 - Engineering Graphics</td>
<td>2</td>
</tr>
<tr>
<td>ISE 326 - Production and Operation Systems I</td>
<td>3</td>
</tr>
<tr>
<td>ISE 327 - Production and Operation Systems II</td>
<td>3</td>
</tr>
<tr>
<td>ME 370 - Mechanics of Materials</td>
<td>4</td>
</tr>
</tbody>
</table>

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Suggested Schedule of Courses for Full-time Industrial and Systems Engineering Students

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA 153</td>
<td>MA 154</td>
<td>MA 233</td>
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<tr>
<td>3</td>
<td>3</td>
<td>3</td>
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<tr>
<td>*Hu/SS Elec.</td>
<td>*Hu/SS Elec.</td>
<td>ECN 239</td>
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<tr>
<td>CH 121 &amp; 125</td>
<td>PH 111</td>
<td>PH 112</td>
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<td>EE 197</td>
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<td>MA 251</td>
<td>MA 244</td>
<td>MA 352</td>
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<td>ME 294</td>
<td>ME 271</td>
<td>ME 370</td>
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<td>ISE 326</td>
<td>ISE 321</td>
<td>EH 301</td>
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<td>ME 198</td>
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<tr>
<td>EE 300</td>
<td>EE 311 &amp; 301</td>
<td>ISE 327</td>
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<td>ISE 390</td>
<td>ISE/ME 378</td>
<td>ISE 427</td>
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<td>ME 362</td>
<td>ISE 490</td>
<td>ME 493</td>
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<td>Sci. Elec.</td>
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<tr>
<td>ISE 424</td>
<td>ISE 429</td>
<td>Engr. Elec.</td>
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<td>ISE 428</td>
<td>ISE 447</td>
<td>ISE 423</td>
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<td>ISE 430</td>
<td>*Hu/SS Elec.</td>
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<td>*Hu/SS Elec.</td>
<td>AHS 392</td>
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<tr>
<td>*Hu/SS: 12 hours in humanities and social sciences.</td>
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<td>Total hours</td>
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</table>

Industrial and Systems Engineering (ISE)

321 Engineering Economy 3 hrs.
Economic evaluation of engineering alternatives. Interest, depreciation, time-value of investments, learning curves, income tax break-even and minimum-cost analysis, and replacement analysis. Prerequisite: EC 239, MA 154. Not open to Freshmen.
326 Production and Operation Systems I 3 hrs.
Quantitative methods used in planning, analysis, design, and control of production systems. Lab fee: Level 4. Prerequisites: MA 154, EE 197.

327 Production and Operation Systems II 3 hrs.
Continuation of ISE 326 with additional quantitative methods for analysis, designing, and control of productive systems. Lab fee: Level 4. Prerequisites: ISE 326, ISE 390.

378 Materials and Manufacturing Processes 3 hrs.
Manufacturing processes. Technical and economic feasibility of different processes. Control by mechanical and metallurgical means of properties of both ferrous and nonferrous materials. Manufacturing equipment, tooling, and process design. Field trip included. Prerequisites: ME/CE 362, 370. (Same as ME/CE 378).

390 Probability and Engineering Statistics I 3 hrs.
Engineering uses of probability theory, discrete and continuous probability distributions including the binomial, Poisson, hypergeometric, Gaussian, uniform, gamma, beta, lognormal, exponential, and extreme value distributions. Applications of statistical sampling, estimation, and hypothesis testing of means, variances, and proportions. Prerequisite or parallel: MA 251.

421 Measurement and Instrumentation in Industrial Processes 3 hrs.
Principles and methods of measurement used in the collection of operating information from industrial processes. Laboratory work includes the use of currently available transducers. Prerequisites: EE 301, 311. (Same as ISE 521.) Lab fee: Level 9.

422 Logistics Planning and Control 3 hrs.
Basic nature of logistics systems. Quantitative analysis of two networks and their interaction, the logical network for project-planning and control, and the physical distribution network, charting, milestone method, lines of balance, PERT-CPM, resource allocation and leveling, and maximum flow and minimum cost algorithms. Prerequisite: ISE 390. (Same as ISE 522.) Lab fee: Level 4.

423 Statistical Quality Control 3 hrs.
Statistical theory and techniques to control quality of manufactured products. Prerequisite: ISE 390. (Same as ISE 523.)

424 Introduction to Ergonomics: Work Development 3 hrs.
Philosophy, methodology, and techniques related to providing optimal match between job requirements and worker skills. Intensive use of actual industrial requirements and experience in practical applications. Prerequisites: ISE 390; ISE 327 or graduate standing. (Same as ISE 524.) Lab fee: Level 5.

425 Metal Processing and Metrology 3 hrs.
Theory and practice of metal removal, including cutting mechanics, interactions of cutting tools and materials; thermal considerations and probabilistic nature of tool life; effect of tool design on process behavior and optimization. Includes laboratory. Prerequisite: ME/CE 370 and senior standing. Lab fee: Level 5.

426 Design and Analysis of Experiments 3 hrs.
Advanced topics in statistical experiments with emphasis on the design aspect. Confounding, fractional replication, factorial and nested design. Prerequisite: ISE 490. (Same as ISE 526.)

427 Management Systems Analysis 3 hrs.
Formal organization structures and functions. Analysis of informal organization function within formal organizations. Techniques for making decisions within formal organizations, together with ethical constraints. Prerequisites: ISE 327, 390.

428 Systems Analysis and Design I 3 hrs.
Philosophy and methods of industrial and nonindustrial systems analysis and design.
Methods of systems definition, analysis, simplification, evaluation, and optimization. Design project required. Prerequisite: ISE 327, 490; ME 493 and senior standing.

429 Systems Analysis and Design II 3 hrs.
Continuation of design project begun in ISE 428. Prerequisite: ISE 428.

430 Modern Manufacturing/Production Systems 3 hrs.
Overview of modern manufacturing and production systems, including principles, theory and practical applications of integrated manufacturing systems with and without robotics and automated materials handling. Includes review of classical systems, Japanese production systems, and group technology. Prerequisite: Senior Standing. (Same as ISE 530.) Lab fee: Level 4.

431 Microprocessor Applications in Manufacturing 3 hrs.
The use of minicomputers, microprocessors, and programmable controllers to control manufacturing processes with extensions into adaptive control. Real systems will be modeled in the laboratory using concepts of physical systems simulation. Prerequisite: 421 (Same as ISE 531.) Lab fee: Level 9.

439 Selected Topics in Industrial and Systems Engineering Credit to be arranged

447 Introduction to Digital Simulation 3 hrs.
Philosophy and elements of digital simulation. Review of queueing models and stochastic process models; discrete-event simulation with emphasis on analysis of systems and models. Prerequisite: EE 197, ISE 390 or equivalent. (Same as ISE 547.) Lab fee: Level 7.

471 Systems Simulation Laboratory I - GPSS 2 hrs.
Modeling and digital simulation of systems using GPSS. Prerequisite: EE 197. (Same as ISE 571.)

472 Systems Simulation Laboratory II - SIMAN 2 hrs.
Modeling and digital simulation of systems using SIMAN. Prerequisite: EE 197. (Same as ISE 571.)

473 Systems Simulation Laboratory III - DYNAMO 2 hrs.
Modeling and simulation of dynamic feedback systems. Prerequisite: EE 197. (Same as ISE 573.)

490 Probability and Engineering Statistics II 3 hrs.
Continuation of ISE 390 with regression analysis, analysis of variance, and non-parametric statistics. Design of engineering experiments, quality control, and computer solution of large-scale problems. Prerequisite: ISE 390.

Industrial and Systems Engineering Graduate Programs
The Department of Industrial and Systems Engineering encourages students to tailor their graduate programs with a blend of theory and applications. Major and minor subject areas within the department are Applied Statistics, Engineering (Technical) Management, Manufacturing Systems, Operations Research, Product Assurance and Systems Engineering. The Master of Science in Operations Research (M.S.O.R.) degree is specifically intended for students with undergraduate degrees in science or mathematics who do not desire to take the additional undergraduate engineering courses needed to qualify for the MSE degree.

The Engineering Management Option meets the needs of practicing engineers who find themselves performing engineering management functions without the benefit of formal management education. The program builds upon the mathematical and analytical expertise gained from both a formal engineering education and professional experience.

The Systems Engineering Option is for persons with a Bachelor's degree in a traditional engineering area who desire to broaden their background into systems oriented aspects of
engineering. Methods of needs identification, cost-benefit analysis, the system life cycle concept, quality control, logistics planning and control, forecasting, etc., will provide students with the analysis and design tools to supplement those learned in their baccalaureate engineering degree program.

Admission and degree requirements are those outlined by the School of Graduate Studies and the College of Engineering.

The M.S.O.R. Degree

The Master of Science in Operations Research (M.S.O.R.) is primarily for graduate students with an interest in operations research, that is, the solution of real-world problems through diverse methods, techniques, tools, and algorithms.

The M.S.O.R. program is concerned with optimization, stochastic systems analysis, and operations research applications. Areas of application include large-scale systems analysis, analysis of urban and socioeconomic systems, and management sciences. This program is open to students not holding an engineering undergraduate degree.

Admission Requirements

The requirements for admission to the O.R. program conform to policies of the School of Graduate Studies. In addition, the following are required: (1) a minimum score of 500 on the quantitative portion of the GRE, (2) mathematics through calculus (MA 251), and (3) six hours of either applied or mathematical statistics.

Degree Requirements

The program of study in Operations Research contains a minimum of 24 semester hours of graduate-level coursework that includes: (a) 12 semester hours of graduate-credit courses in operations research, including ISE 626, 636, and either 629 or 547; (b) six hours of courses in approved minor area; (c) six hours in another minor, i.e., statistics, mathematics, etc.; and (d) an acceptable thesis. A plan II is also available. Detailed instruction governing the M.S.O.R. program should be obtained from the chairman of the Industrial and Systems Engineering Department.

Graduate ISE

521 Measurement and Instrumentation in Industrial Processes 3 hrs.
Principles and methods of measurement used in the collection of operating information from industrial processes. Laboratory work includes the use of currently available transducers. Prerequisites: EE 301, 311. (Same as ISE 421) Lab Fee: Level 9.

522 Logistics Planning and Control 3 hrs.
Basic nature of logistics systems. Quantitative analysis of two networks and their interaction, the logical network for project-planning and control, and the physical distribution network. Charting, milestone method, lines of balance, PERT-CPM, resource allocation and leveling, and maximum flow and minimum cost algorithms. Prerequisite: ISE 390. (Same as ISE 422) Lab Fee: Level 4.

523 Statistical Quality Control 3 hrs.
Statistical theory and techniques to control quality of manufactured products. Prerequisite: ISE 390. (Same as ISE 423)

524 Introduction to Ergonomics: Work Development 3 hrs.
Philosophy, methodology, and techniques related to providing optimal match between job requirements and worker skills. Intensive use of actual industrial requirements and experience in practical applications. Prerequisites: ISE 390; ISE 327 or graduate standing. (Same as ISE 424) Lab Fee: Level 5.
Design and Analysis of Experiments 3 hrs.
Advanced topics in statistical experiments with emphasis on design aspect. Confounding, fractional replication, factorial and nested design. Prerequisite: ISE 490. (Same as ISE 426)

Modern Manufacturing/Production Systems 3 hrs.
Overview of modern manufacturing and production systems, including principles, theory and practical applications of integrated manufacturing systems with and without robotics and automated materials handling. Includes review of classical systems, Japanese production systems, and group technology. Prerequisite: Senior standing. (Same as ISE 430) Lab Fee: Level 4.

Microprocessor Applications in Manufacturing 3 hrs.
The use of minicomputers, microprocessors, and programmable controllers to control manufacturing processes with extensions into adaptive control. Real systems will be modeled in the laboratory using concepts of physical systems simulation. Prerequisite: ISE 521. (Same as ISE 431) Lab Fee: Level 9.

Selected Topics in Industrial Engineering Credit to be arranged

Quality Assurance 3 hrs.
Philosophy and design techniques for achieving a stable quality assurance program; role of quality assurance in test and development; roles of management and labor in a total quality assurance system. Prerequisites: ISE 390 or ISE 690, ISE 523.

Introduction to Digital Simulation 3 hrs.
Philosophy and elements of digital simulation. Review of queuing models and stochastic process models. Discrete-event simulation with emphasis on analysis of systems and models. Prerequisites: EE 197, ISE 390 or equivalent. (Same as ISE 447) Lab Fee: Level 7.

System Simulation Laboratory I GPSS 2 hrs.
Modeling and Digital Simulation of Systems using GPSS. Prerequisite: EE 197. (Same as ISE 471)

System Simulation Laboratory II SIMAN 2 hrs.
Modeling and Digital Simulation of Systems using SIMAN. Prerequisite: EE 197. (Same as ISE 472)

Systems Simulation Laboratory III 2 hrs.
Modeling and Simulation of Dynamic Feedback Systems using DYNAMO. Prerequisite: EE 197. (Same as ISE 473)

Engineering Management I 3 hrs.
Principles of executive process in technical organizations. Basic management functions, scientific management, planning, directing, controlling, and decision making as they relate to management of technical organizations and design and implementation of management systems. Prerequisite: Graduate standing.

R & D Management 3 hrs.
Research unique to the management of organizations engaged in R&D activities. Management control systems for R&D projects, motivation of technical personnel, problems of managing the creative person, means of increasing creativity, and management of change. Prerequisite: ISE 620.

Engineering Economic Analysis 3 hrs.
Mathematical models for expenditure analysis under uncertainty. Relationship between investment decision criteria and microeconomic theory. Capital planning and budgeting. Decisions involving expansion, acquisitions, replacement, and disinvestment. Prerequisite: ISE 490 or ISE 690.
624 Advanced Ergonomics: Man-Machine Interfaces 3 hrs.
Psychological, physiological, and anthropometric requirements of human beings and
their relationship to design specifications for machines in man-machine interfaces.
Prerequisite: ISE 524. Lab Fee: Level 4.

626 Introduction to Operations Research 3 hrs.
Philosophy and methodology of operations research. Prerequisite: EE 197 or CS 113,
ISE 390 or 690, MA 251. Lab Fee: Level 5.

627 Introduction to Systems Engineering 3 hrs.
Overview of engineering analytic methods applied to design of operational, procedural,
and hardware systems. Concepts of the system life cycle, and cost-benefit and tradeoff analysis. Use of engineering models of components, logic, signals, and organization in systems analysis. Prerequisites: ISE 390 or EE 505 or EE 506 or ISE 690.

628 Engineering Management II 3 hrs.
Organization and human relations of technical management. Formal and informal
organizations, job satisfaction, motivation of employees, manager-employee relations, social behavior in work situation, and executive management functions as they influence design and implementation of management systems. Prerequisite: ISE 620.

Classical optimization theory with introduction to search techniques, the Jacobian,
and Lagrangian methods. Kuhn-Tucker conditions, quadratic programming, geometric and dynamic programming, and several search procedures. Prerequisites: ISE 626, 390 or 690. Lab Fee: Level 7.

630 Automation: Numeric Control to Computer-Aided Manufacturing 3 hrs.
Numerical Control, CNC, DNC, FMS, unmanned cellular manufacturing systems,
robotics, autonamation and other aspects of programmable automation systems found in CAM. Includes introduction to adaptive control, NC and robot programming. Prerequisite: ISE 530. Lab Fee: Level 7.

631 Management Information Systems 3 hrs.
Design of integrated information systems necessary for effective management.
Methods of systems design, basic concepts of computer processing systems, design of management information procedures and reports, and their application to mechanized and electronic data-processing equipment. Prerequisite: EE 197 or CS 113.

632 Stochastic Systems 3 hrs.
Processes whose outputs are governed by probabilistic laws. Gaussian processes, processes with correlated and uncorrelated variables, and non-Markov processes. Prerequisite: ISE 490 or 690. Lab Fee: Level 4.

633 Industrial Forecasting and Analysis I 3 hrs.
Industrial forecasting methods. Simple forecasting models, multivariate regression,
correlation, and spectral analysis, exponential smoothing, and Box-Jenkins forecasting. Prerequisite: ISE 490 or ISE 690. Lab Fee: Level 5.

634 Value and Decision Theory 3 hrs.
Mathematical development of decision-making process. Statistical decision theory
and game theory applied to decision making under risk and uncertainty. Consideration of utility, benefit functions, opportunity loss and value of additional information. Prerequisite: ISE 390 or 690.

635 Linear Programming 3 hrs.
Application of linear programming to complex allocation problems. Methods for determining maximum or minimum of objective functions whose variables are subject to constraints. Simplex methods, degeneracy, modified simplex, transportation prob-
lems, network flows, goal programming, and sensitivity analysis. Prerequisite: ISE 626. Lab Fee: Level 6.

636 Systems Modeling 3 hrs.
Philosophy and methodology for modeling probabilistic systems. Team project required. Prerequisites: ISE 390 or 690, ISE 626 or 627. Lab Fee: Level 6.

638 Engineering Reliability 3 hrs.
Methodology of reliability prediction including application of discrete and continuous distribution models. Reliability estimation, reliability logic diagrams, life testing, and reliability demonstrations. Prerequisite: ISE 490 or 690.

639 Selected Topics in Industrial and Systems Engineering  Credit to be arranged
3 hrs.

641 Product Assurance 3 hrs.
Application and control of the product assurance process during design and production; systems engineering approach to providing product assurance, including but not limited to reliability growth projections, criticality analysis and failure mode analysis. Prerequisite: ISE 541.

647 System Simulation 3 hrs.
Methods and procedures for simulation of large and complex systems. Discrete increment, continuous time and combined models. Comparison of discrete-event simulation languages. Model verification and validation. Statistical inference. Input data collection and analysis. Prerequisite: ISE 547. Lab Fee: Level 7.

648 Reliability, Availability, and Maintainability 3 hrs.
In-depth application of decision theory and MIL-HDBK-217, and maintenance engineering techniques in order to achieve targeted reliability, availability and maintainability design goals. Prerequisite: ISE 638.

671 Acquisition Management I 3 hrs.
The budgeting and major systems acquisition policies and procedures of the Department of Defense, Federal Acquisition Regulations (FARS), requirements determination, and cost estimating techniques and methodologies. Prerequisite: ISE 690. (Same as PRM 671)

672 Acquisition Management II 3 hrs.
Department of Defense contract administration and organization, source evaluation and selection, types of contracts, solicitations, negotiations, subcontracts, legislative requirements and impacts, contract termination and litigation. Prerequisite: ISE 671. (Same as PRM 672)

690 Statistical Methods for Engineers 3 hrs.
Application of probability and statistics useful in research work. Descriptive statistics, theoretical distribution functions, point and interval estimates, tests of hypotheses, linear regression, and analysis of variance. Prerequisites: MA 251 and graduate standing.

699 Master's Thesis 3 or 9 hrs.
Required each term student is working and receiving direction on his master's thesis. Minimum of two terms and six hours required for M.S.E. students. A maximum of nine hours of credit is awarded upon successful completion of master's thesis.

729 Advanced Nonlinear Programming 3 hrs.
Continuation of ISE 629 with emphasis on development and application of nonlinear programming algorithms. SUMT algorithm, Zoutendyk's method of feasible directions, Rosen's gradient method, and selected algorithms from current literature. Prerequisite: ISE 629. Lab Fee: Level 7.
Multi-criteria Decision Analysis 3 hrs.
Methods for analysis of management-decision problems involving multiple goals and constraints. Linear and nonlinear goal programming; risk programming and decision making in fuzzy environments. Prerequisite: ISE 635.

Industrial Forecasting and Analysis II 3 hrs.
Industrial forecasting methods. Box-Jenkins model diagnostic checking, seasonal models, and transfer function modeling. Prerequisite: ISE 633. Lab Fee: Level 5.

Discrete Optimization 3 hrs.
Integer programming and network analysis. Zero-one problem formulation and Balas method, cutting plane techniques, branch and bound, out-of-kilter algorithm, and special applications of integer programming. Prerequisite: ISE 635. Lab Fee: Level 6.

Selected Topics in Industrial and Systems Engineering Credit to be arranged

Advanced Simulation Design and Analysis 3 hrs.

Advanced Statistical Applications 3 hrs.
Continuation of ISE 690 with extension to nonparametric methods, multivariate analysis and clustering techniques. Prerequisite: ISE 690. Lab Fee: Level 5.

Doctoral Dissertation 3-9 hrs.

Mechanical Engineering

Degrees: Bachelor of Science in Engineering
Master of Science in Engineering
Doctor of Philosophy

Professors Chung, Cost, Gilbert, Harwell, Hung, Liu, Karr (chair), Russell, Shih, Wallace, Wessling, Wu; Associate Professors Brainerd, Chen, Schonberg, Smith, Thompson; Assistant Professors Bower, Crull, Musielak, Thomas, Uber.

The range of faculty research interests in the Department of Mechanical Engineering is broad. It affords graduate students opportunities for advanced work in fluid and solid mechanics, heat transfer, aerodynamics, thermodynamics, transport phenomena, propulsion, chemical processes, environmental engineering and systems. The Master and Ph.D. degrees granted by the Department in these areas are equivalent to those available in traditional Mechanical, Chemical, Civil, and Aerospace Engineering programs. Support is available at attractive levels for all qualified students, including assistantships, tuition grants and graduate Co-op’s with many local research and industrial organizations. UAH has the intellectual and social environment to provide a well-rounded, technologically-oriented degree.

Admission Requirements to the Graduate Programs

The Department of Mechanical Engineering rarely accepts students who have below a 3.00 GPA (undergraduate) from an ABET accredited school. Outstanding (3.5 GPA) students from other technical fields may gain admittance to M.E. by completing certain undergraduate courses. Please contact the M.E. Department for further details.
M.S.E. and Ph.D. in Mechanical Engineering

All M.S.E. students in the Mechanical Engineering Department are guided through one of two specialized areas of concentration; each area has a core of three required courses. The fluid and thermal science area requires ME 649, 651, and 671. The structures and materials area requires ME 561, 574 and 671. Other areas of concentration also have particular requirements. The remainder of the program and elective courses are chosen with the approval of the student's advisor. M.S.E. students must enroll in the departmental seminar, ME 683, for one term. The Department of Mechanical Engineering offers a program leading to the degree of Doctor of Philosophy. The program is based on scholarly, independent and original investigation coherently reported as a dissertation. Such work is supervised by an experienced researcher and recognized authority in the field. Course work, written and oral exams, and the dissertation are all essential components of the Ph.D. Because the Department also offers advanced work in certain areas in civil and chemical engineering, the Ph.D. studies are rather broad and include areas not associated with the traditional mechanical engineering advanced degree. All Ph.D. students must enroll in the departmental seminar, ME 683, for three terms.

Ph.D. students in Mechanical Engineering must meet the minimum requirements set by the School of Graduate Studies. ME doctoral students must also meet some additional requirements set by the Department (Contact the chair.)

Mechanical Engineering Option.

Mechanical engineering is a broad field that traditionally comprises three primary subfields: energy, mechanisms and machinery, and manufacturing. The work done by mechanical engineers includes the design, construction, and use of systems for the conversion of energy available from natural sources (water, fossil fuels, nuclear fuels, solar radiation) to other forms of useful energy (for transportation, heat, light, power); design and production of machines to lighten the burden of servile human work and to do work otherwise beyond human capability; processing of materials into useful products; and creative planning, development, and operation of systems using energy, machines, and resources.

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<tr>
<th>Semester Hours</th>
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<tr>
<td><strong>Additional Basic Sciences</strong></td>
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<tr>
<td>Chemistry - CH 123, 126 ........................................ 4</td>
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### Mechanical Engineering Option

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<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Semester Hours</th>
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<tr>
<td>ME 198</td>
<td>Engineering Graphics ...................................... 2</td>
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<tr>
<td>ME 341</td>
<td>Thermodynamics I .......................................... 3</td>
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<tr>
<td>ME 342</td>
<td>Thermodynamics II .......................................... 3</td>
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<td>ME/CHE 352</td>
<td>Fluid Mechanics I .......................................... 3</td>
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<tr>
<td>ME 364</td>
<td>Kinematics and Dynamics of Machines ..................... 4</td>
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<td>ME/CE 370</td>
<td>Mechanics of Materials .................................... 4</td>
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<tr>
<td>ME/ISE 378</td>
<td>Materials and Manufacturing Processes .................. 3</td>
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<tr>
<td>ME 396</td>
<td>Numerical Methods and Computations ...................... 3</td>
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<tr>
<td>ME/CHE 442</td>
<td>Introduction to Heat and Mass Transfer ................ 4</td>
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<tr>
<td>ME 446</td>
<td>Design of Thermal Systems ................................ 3</td>
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<tr>
<td>ME 447</td>
<td>Energy Conversion and Power Generation I ............. 3</td>
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<tr>
<td>ME 454</td>
<td>Fluid Mechanics II ......................................... 3</td>
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<td>ME 465</td>
<td>Engineering Design ......................................... 3</td>
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<td>ME 466</td>
<td>Mechanics and Design of Machine Elements .............. 3</td>
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<tr>
<td>ME 488</td>
<td>Analysis of Engineering Systems ........................ 3</td>
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<tr>
<td>*Technical Electives ........................................... 7</td>
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*ME courses at level 300 or above or other upper level courses approved by the Department of Mechanical Engineering.
Students applying for graduation in the Mechanical Engineering Option after September 1, 1990 must show evidence of having taken the Fundamentals of Engineering (FE) Examination. The exam is offered by the State of Alabama board of Registration for Professional Engineers, 750 Washington Ave., Montgomery, AL. 36130-1001. Phone: (205) 261-5568. Contact the College of Engineering for further information.

Suggested Schedule of Courses for Full-time Mechanical Engineering Students

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<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
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<tbody>
<tr>
<td>MA 153</td>
<td>3</td>
<td>3 MA 233</td>
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<tr>
<td>CH 121 &amp; 125</td>
<td>4</td>
<td>4 PH 112</td>
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<tr>
<td>ME 198</td>
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<td>4 EE 197</td>
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<tr>
<td>*Hu/SS</td>
<td>3</td>
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<td>12</td>
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| MA 251     | 3            | 3 MA 352    | 3           |
| *Hu/SS     | 3            | 3 ME/CE 271 | 3           |
| EC 239     | 3            | 3 ME/CHE 294 | 4         |
| *Hu/SS     | 3            |             |             |
|            | 12           | 12          | 10 34       |

| ME 341     | 3            | 3 EE 311 & 301 | 4       |
| ME/CE 362 | 3            | 3 ME/CHE 352 | 3           |
| ME/CE 370 | 4            | 3 ME 364     | 4           |
|            | 10           | 11          | 11 32       |

| ME/CHE 442 | 4            | 3 AHS 392    | 3           |
| ME 454     | 3            | 3 ME 488     | 3           |
| ME 466     | 3            | 3 Tech. Elec. | 4         |
| ME 493     | 2            |             |             |
|            | 12           | 12          | 10 34       |

*Hu/SS: 12 hours in humanities/social sciences

**Total hours 133**

**Mechanical Engineering (ME)**

**198 Engineering Graphics**
Principles of engineering graphical expression: sketching, instrument drawing, orthographic projections. Descriptive geometry problems involving locations, relationships of points, lines, areas, and bodies, and intersection of surfaces. Dimensioning for production, pictorial design, vector geometry, and monographs. Prerequisite: MA 119. Lab fee: Level 5.

**271 Statics**
Topics include: forces, resultant forces, moments, couples equivalent force systems, equilibrium, distributed loads, two force members, trusses, centroids, moments of inertia, shear and bending moment diagrams, static and kinematic friction. Prerequisites or parallel MA 251, PH 112. (Same as CE 271).
Structure of matter, basic concepts of phase transformation, mechanical, electrical, magnetic, and thermal properties, and corrosion. Basic properties of metals, plastics, elastomers, and ceramics with emphasis on methods of changing properties. Laboratory included. Typical experiments include microstructure analysis, hardness testing, mechanical-properties testing, equilibrium-phase diagrams, corrosion, creep behavior, and semiconductor analysis. Prerequisite: CH 121, PH 112. Lab fee: Level 7. (Same as CHE 294).

341 Thermodynamics I 3 hrs.
Basic laws of energy that apply in all branches of engineering and science. Properties of matter, state variables, reversible processes, first and second laws of thermodynamics with applications to closed and open systems. Availability of energy and irreversibility. Prerequisites: MA 251, ME/CHE 294 (or parallel).

342 Thermodynamics II 3 hrs.
Continuation of ME 341. Thermodynamic cycles, thermodynamic relations among properties, chemical reactions, and phase and chemical equilibrium. Prerequisite: ME CHE 341.

352 Fluid Mechanics I 3 hrs.
Properties of fluids and fundamental principles governing fluid motion, including fluid statics, conservation of mass, momentum and energy with applications to pipe, and channel flows of incompressible fluids. Laboratory included. Prerequisites: ME 341, ME/CE 362, MA 352. Lab fee: Level 7. (Same as CHE 362).

362 Dynamics 3 hrs.
Kinematics and kinetics of particle and systems of particles with applications to central force motion, impact, relative motion, vibrations, and variable mass systems. Dynamics of rigid body in plane motion, relative motion in rotating coordinates, and gyroscopic motion. Prerequisite: ME/CE 271 (Same as CE 362).

364 Kinematics and Dynamics of Machines 4 hrs.
Kinematics and dynamics of planar machinery. Principles of mechanisms, design of cams, fundamentals of gears and epicyclic gear trains, methods of determination of velocity and acceleration in mechanisms. Inertia forces in machines, balancing of rotating masses and reciprocating masses, and vibration analysis. Prerequisite: ME/CE 362. Lab fee: Level 5.

370 Mechanics of Materials 4 hrs.
Topics include: theory of stress and strain, Hooke’s law, analysis of stresses and deformations in bodies loaded by axial, torsional, bending, and combined loads, and analysis of statically indeterminate systems. Laboratory includes: the determination of selected properties of various engineering materials, experimental verification of theories presented, use of strain measuring devices, test procedures, instrumentation, and interpretation of results. Prerequisites: ME/CE 271, ME/CHE 294. (Same as CE 370).

378 Materials and Manufacturing Processes 3 hrs.
Engineering properties of materials, sources of information for properties of materials, cost considerations for material selection, manufacturing processes, casting, forming, machining, cost considerations for machining operations. One or more field trips included. Prerequisite: ME/CE 370. (Same as ISE 378.)

394 Introduction to CAD/CAM 3 hrs.
Introduction to computer aided graphics. Representation of systems and bodies using computers, graphic file organization. Elements of computer graphics, manipulation of elements, rotation of views, and use of intergraph CAD systems. Laboratory projects. Prerequisite: ME 198, ME/CE 271. Lab fee: Level 5.
396 Numerical Methods and Computation 2 hrs.

398 Selected Topics in Mechanical Engineering Credit to be arranged
Prerequisite: permission of instructor.

442 Introduction to Heat and Mass Transfer 4 hrs.
Principles of heat and mass transfer; application of principles to problems in conductive, convective, and radiative-heat transfer and mass transfer; laminar and turbulent flow processes; boiling and condensation; heat exchangers. One credit hour laboratory included. Prerequisites: ME 341, ME/CHE 352, 396, MA 352. Lab fee: Level 6. (Same as CHE 442).

444 Analysis and Design of HVAC Systems 3 hrs.
Analysis and design of heating, ventilation, and air-conditioning (HVAC) systems. Design requirements for human comfort, exterior weather conditions, and energy conservation. Calculation of heating and cooling loads for residential and commercial buildings, air and liquid distribution systems, selection and specification of system components, energy recovery and system efficiency, and commercially available systems. Prerequisites: ME 342, ME/CHE 442. (Same as ME 544.)

446 Design of Thermal Systems 3 hrs.
Principles of heat transfer, thermodynamics, and fluid mechanics applied to analysis and design of systems for storage and transport, and exchange of thermal energy. Modeling of thermal equipment, simulation of system performance, optimization of system design, and comprehensive design of thermal systems. Prerequisites: ME 342, 459; ME/CHE 442; ME 493 recommended.

447 Energy Conversion and Power Generation I 3 hrs.
Application of principles of thermodynamics and fluid mechanics and economics to analysis and design of conventional hydro and steam power plants. Energy sources and end uses, fossil fuels, combustion equipment, steam generators, and pollution control devices. Hydro, steam, and wind turbines. Prerequisites: ME/CHE 352, 442, ME 454, ME 446 recommended. (Same as ME 547.)

451 Atmospheric Fluid Dynamics 3 hrs.
A study of fluid dynamics in the atmosphere. Coriolis acceleration, scale analysis, and appropriate approximations of the complete governing equations. Numerical analysis and interpretation of weather phenomena. Prerequisites: MA 352, ME 341, ME/CHE 352 or equivalent. (Same as ME 551, ES 551.)

454 Fluid Mechanics II 3 hrs.
Continuation of ME 352 - differential form of basic equations, dimensional analysis, boundary layers, one-dimensional compressible flow, potential flow, turbomachinery. Prerequisites: ME/CHE 352.

459 Selected Topics in Engineering Credit to be arranged

461 Vibrations of Elastic Systems 3 hrs.
Formulation of the equations of motion of discrete and continuous systems, analytical and numerical methods of solution, eigenvalue problems and dynamic response. Prerequisite: ME 488. (Same as ME 561 and and CE 461/561).

465 Mechanical Engineering Design 3 hrs.
Senior design project. Prerequisites: ME 493, senior standing, and permission of instructor. Lab fee: Level 4.

166
466 Mechanics and Design of Machine Elements 3 hrs.
Detailed design and selection of machine elements such as gears, shafts, and bearings. Analysis of stresses and deformations under combined static and dynamic loads, stress concentrations, and fatigue. Prerequisites: ME 198, 364, ME/CE 370.

470 Mechanics of Materials II 3 hrs.

474 Applied Mechanics of Solids 3 hrs.
Stresses and strains at a point, theories of failures, stress concentration factors, thick-walled cylinders, torsion of noncircular members, curved beams, unsymmetrical bending, and shear center. Prerequisite: ME/CE 370. (Same as ME 574 and CE 474/574).

Experimental methods to determine stress, strain, displacement, velocity, and acceleration in various media. Theory and laboratory applications of electrical resistance strain gages, brittle coatings, and photoelasticity. Application of transducers and experimental analysis of engineering systems. Prerequisites: ME/CE 370 and Junior Standing. Lab fee: Level 7. (Same as ME 577 and CE 477/577).

478 Matrix Methods in Structural Mechanics 3 hrs.
Matrix application to formulation and solution of linear problems in structural mechanics. Stresses, vibrations, and stability of engineering structures. Prerequisite: CE 381. (Same as ME 578 and CE 478/578).

480 Aircraft Stability and Control 3 hrs.
The stability and control of aerodynamic vehicles. The design of aircraft to obtain good flying characteristics. The complete governing equations and analog solutions of linearized equations. Prerequisites: ME 454, 488. (Same as ME 580.) Lab fee: Level 7.

485 Numerical Methods and Computation II 3 hrs.
Advanced topics in numerical methods and computation including Gaussian quadrature; interpolation, integration and differentiation using cubic splines; eigenvalue and eigenvector analysis of large systems; round-off error analysis; stability and convergence analysis of iterative methods. Prerequisite: ME 396. (Same as ME 585.) Lab fee: Level 7.

486 Numerical Engineering Analysis 4 hrs.
Finite elements and finite differences in solving various engineering problems. Numerical applications to fluid mechanics, heat transfer, structural mechanics, and machine design. Prerequisite: ME 396. (Same as ME 586.)

488 Analysis of Engineering Systems 3 hrs.
Mathematical modeling of physical systems and determining their dynamic response. Mechanical, electrical, electromechanical, heat transfer, fluid-mechanical, and other engineering problems. Prerequisite: senior engineering standing.

489 Computer-Aided Engineering 4 hrs.
Application of computer methods in the analysis and design of structural, thermal, and dynamical systems. Uses of state-of-the-art finite element and finite difference computer programs. Practical guidelines for discrete modeling; analysis of modeling errors. Comparison of exact and approximate solutions to boundary value problems. Use of microcomputers in engineering design and analysis. Prerequisite: ME 396.
493 Introduction to Engineering Design  2 hrs.
Application of basic design principles and concepts. Design methodology, decision
making, creativity, product liability, human factors, patents, and others. Team de-
design projects. Prerequisite: ISE 321, ME/CE 362, EE 300.

496 Selected Topics in Mechanical Engineering  Credit to be arranged

Graduate ME Courses

531 Introduction to Plasma dynamics  3 hrs.
Plasma kinetic theory including charged-particle and neutral collision, ionization,
electronic excitation and recombination, motion of charged particles, macroscopic
equations. Transport coefficients, gas discharges, instabilities, sheaths, electromag-
netic waves. Prerequisites: PH 321, 431.

540 Physical Properties of Fluids  3 hrs.
Theoretical, experimental, and correlation methods for determining and predicting
the thermodynamic and transport properties of various fluids. Critical properties,
equations of state, vapor pressure and latent heat, heat capacity. Viscosity, thermal
conductivity, diffusion coefficient, phase equilibrrium, heat and free energy for for-
mation. Prerequisite: ME 342. Offered upon demand. (Same as CHE 540).

542 Internal Combustion Engines  3 hrs.
Application of principles of thermodynamics, heat transfer, and fluid mechanics to
combustion engines and turbines. Basic engine types, engine components, idealized
cycles, combustion, fuels, engine variables, testing, exhaust gas analysis, and air
pollution as related to spark-ignition, compression-ignition, and turbine engines. Pre-
requisites: ME 342, 442, 454.

545 Heat Distribution System Design  3 hrs.
Design of hydronic and air distribution systems used in heating and air conditioning.
Piping design, pump selection, heat coils, room air distribution, ducting design, fan
selection, controls, and complete systems. Prerequisites: ME 454, 544; ME 446 rec-
ommended.

546 Solar Energy Systems  3 hrs.
Components for solar-energy systems (collectors, heat exchangers, thermal storage).
Numerical simulation of solar energy systems, and solar energy system design.
Residential and commercial space heating, process heating, and hybrid system ap-
lications. Prerequisites: ME 446, 544; ME 454 recommended.

547 Energy Conversion and Power Generation I  3 hrs.
Application of principles of thermodynamics and fluid mechanics and economics to
analysis and design of conventional hydro and steam power plants. Energy sources
and end uses, fossil fuels, combustion equipment, steam generators, and pollution
control devices. Hydro, steam and wind turbines. Prerequisites: ME 352, 442, 454;
ME 446 recommended.

548 Energy Conversion and Power Generation II  3 hrs.
Application of principles of thermodynamics, heat transfer, and fluid mechanics to
combustion engines and turbines. Basic engine types, engine components, idealized
cycles, combustion, fuels, engine variables, testing, exhaust gas analysis, and air
pollution as related to spark-ignition, compression-ignition, and turbine engines. Pre-
requisites: ME 342, 442, 454.

551 Atmospheric Fluid Dynamics  3 hrs.
A study of fluid dynamics in the atmosphere. Coriolis acceleration, scale analysis,
and appropriate approximations of the complete governing equations. Numerical
analysis and interpretation of weather phenomena. Prerequisites: MA 352, ME 341,
ME 352 or equivalent. (Same as ME 451 and ES 551.)
553 Atmospheric Radiation 3 hrs.

556 Turbomachinery 3 hrs.
The application of the principles of fluid mechanics and thermodynamics to the analysis and design of dynamic fluid machines classified as turbomachines, including axial and centrifugal flow pumps and fans, compressors, and hydro-and gas turbines. Prerequisites: ME 342, 454.

557 Fundamentals of Aerodynamics 3 hrs.
The application of the principles of fluid mechanics and thermodynamics to the prediction of aerodynamic performance of aircraft, missiles and other flight vehicles. Topics include lift and drag, thrust and power, and the influence of wing loading, power loading, zero-list drag, wing geometry, high lift devices Mach number, etc., on the performance and design trades of flight vehicles. Prerequisites: ME 342, 454.

558 Dimensional Analysis and Similitude 3 hrs.
Nature and use of dimensions, principles of dimensional analysis, systematic calculation of dimensionless products, algebraic theory of dimensional analysis, similarity and model testing. Applications to problems of stress and strain, dynamics, fluid mechanics. Theory of heat and electrical phenomena, differential equations and similarity. Prerequisite: ME/CHE 352. Offered upon demand only.

559 Selected Topics in Mechanical Engineering Credit to be arranged

561 Vibrations of Elastic Systems 3 hrs.
Formulation of the equations of motion of discrete and continuous systems, analytical and numerical methods of solution, eigenvalue problems, and dynamic response. Prerequisite: ME 488. (Same as ME 461 and CE 461/561).

563 Intermediate Dynamics 3 hrs.
Kinematics and dynamics of particles, system of particles, and rigid-bodies. Variational principles and Lagrangian mechanics. Prerequisite: ME/CE 362.

570 Mechanical Behavior of Engineering Materials 3 hrs.
Structure, properties, and behavior of materials. Structural defects and their influence on mechanical properties, point defects, dislocation and lattice imperfection in crystals, plastic deformation of single crystal and polycrystalline alloys, strengthening mechanisms and fracture. Strain rate, time to failure, and cyclic life from a microscope viewpoint. Prerequisites: ME/CHE 294, ME/CE 370. (Same as CE 570).

574 Applied Mechanics of Solids 3 hrs.
Stresses and strains at a point, theories of failures, stress concentration factors, thick-walled cylinders, torsion of noncircular members, curved beams, unsymmetrical bending, and shear center. Prerequisite: ME 370. (Same as ME 474 and CE 474/574).

577 Fundamentals of Experimental Mechanics 3 hrs.
Experimental methods to determine stress, strain, displacement, velocity, and acceleration in various media. Theory and laboratory applications of electrical resistance strain gages, brittle coatings, and photoelasticity. Application of transducers and experimental analysis of engineering systems. Prerequisites: ME 370 and junior standing. (Same as ME 477 and CE 477/577). Lab Fee: Level 7.

578 Matrix Methods in Structural Mechanics 3 hrs.
Matrix application to formulation and solution of linear problems in structural mechanics. Applications to trusses, beams, and frames. Prerequisite: CE 381. (Same as ME 478 and CE 478/578).
580 Aircraft Stability and Control 3 hrs.
The stability and control of aerodynamic vehicles. The design of aircraft to obtain good flying characteristics. The complete governing equations and analog solutions of linearized equations. Prerequisites: ME 454, 488. (Same as ME 480.) Lab Fee: Level 7.

581 Atmospheric Thermodynamics 3 hrs.
An introduction to thermodynamics of the atmosphere and relation to weather phenomenon. Review first and second laws, special atmospheric thermodynamics variables, treatment of air-water systems, atmospheric thermodynamic diagrams, atmospheric statics and vertical stability. Prerequisites: MA 352, PH 321. (Same as ES 581.)

585 Numerical Methods and Computation II 3 hrs.
Advanced topics in numerical methods and computation including Gaussian quadrature; interpolation, integration and differentiation using cubic splines; eigenvalue and eigenvector analysis of large systems; round-off error analysis; stability and convergence analysis of iterative methods. Prerequisite: ME 396. (Same as ME 485.) Lab Fee: Level 7.

586 Numerical Engineering Analysis 3 hrs.
Finite elements and finite differences in solving various engineering problems. Numerical applications to fluid mechanics, heat transfer, structural mechanics, and machine design. Prerequisite: ME 396. (Same as ME 486)

589 Computer-Aided Engineering 4 hrs.
Application of computer methods in the analysis and design of structural, thermal, and dynamical systems. Use of state-of-the-art finite element and finite difference computer programs. Practical guidelines for discrete modeling; analysis of modeling errors. Comparison of exact and approximate solutions to boundary value problems. Use of microcomputers in engineering design and analysis. Prerequisite: ME 396. (Same as ME 489.)

601 Physical Metallurgy 3 hrs.

641 Advanced Thermodynamics 3 hrs.
Application of classical thermodynamics. Treatment of problems involving nonideal gases and liquids, phase equilibrium, and chemical equilibrium. Prerequisite: ME 342. (Same as CHE 641).

642 Radiative Sources and Detectors 3 hrs.
Optical and thermal radiative sources and detectors. Sources of detector noise and its influence on performance. Instrumentation using radiative detectors. Prerequisite: Graduate Standing. Lab Fee: Level 7.

643 Intermediate Heat Transfer 3 hrs.
Continuation of ME 442 in the study of heat transfer by conduction, convection, and radiation. Emphasis is on solution of convective and radiative heat transfer by numerical methods. Prerequisite: ME/CHE 442. Lab Fee: Level 7.

644 Information Retrieval in Remote Sensing 3 hrs.
Methods for extracting engineering and scientific information content from indirect sensing measurements. Multi-spectral sensing and spectral pattern recognition. Linear and nonlinear inversion methods. Application to remote sensing from space. Prerequisite: Permission of instructor.
645 Propulsion 3 hrs.
Aerothermodynamics of rocket propulsion systems; rocket propellants and combustion; heat transfer and cooling problems. Application to ramjets and hybrid systems. Prerequisite: ME 651.

649 Transport Phenomena 3 hrs.
Mass, energy, and momentum transport in steady and transient motions in real and rheological substances. Prerequisite: ME 442. (Same as CHE 649).

651 Viscous Fluid Mechanics 3 hrs.
Fundamentals of incompressible viscous fluid motion, including development of Navier-Stokes equation. Exact and approximate solutions for both large and small Reynolds number. Laminar and turbulent boundary layers. Prerequisite: ME 454. Lab Fee: Level 7.

652 Compressible Fluid Mechanics 3 hrs.
Fluid mechanics and thermodynamics of flows of ideal and real gases. Shock waves, Prandtl-Meyer fans, wave interactions, method of characteristics, linearized theory and shock-expansion method with applications to shock tubes, Laval nozzles, wind tunnel, flows about wedges, cones, and supersonic thin airfoils. Prerequisites: ME 454, ME/CHE 442.

653 Computational Fluid Dynamics I 3 hrs.
Finite difference and finite element formulations of incompressible and compressible flows. Explicit and implicit methods, operator splitting, artificial damping, ADI methods, flux-corrected transport. Prerequisite: ME 651. Lab Fee: Level 5.

654 Computational Fluid Dynamics II 3 hrs.
Grid generation techniques, applications of multigrid adaptive methods in incompressible and compressible flows. Vectorization and parallel processing as applied to computational fluid dynamics, applications to practical geometries. Prerequisite: ME 653. Lab Fee: Level 5.

655 Computational Fluid Dynamics III 3 hrs.
Applications to computational methods in aerodynamics problems, treatment of shocks, Kutta conditions, nonvanishing enthalpy and entropy gradients. Prerequisite: ME 653. Lab Fee: Level 5.

657 Potential Flow 3 hrs.
Inviscid flow theory and its applications in aerodynamics and atmospheric flows. Laplace equation, singularities and distributions of singularities, complex potential, conformal mapping. Prerequisite: ME 454. Lab Fee: Level 7.

659 Selected Topics in Mechanical Engineering 3 hrs.
Credit to be arranged

660 Structural Dynamics 3 hrs.

661 Advanced Dynamics 3 hrs.
Variational methods, optimization, and dynamic stability. Lagrangian and Hamiltonian formulation for dynamical systems and Hamilton-Jacobi methods to orbital mechanics. Prerequisite: ME 563.

663 Astrodynamics 3 hrs.
Astronomical coordinates and time systems; the many-body problems and disturbing functions. General perturbation methods, and application of classical mechanics and Hamilton-Jacobi methods to orbital mechanics. Prerequisite: ME 563.
Continuum Mechanics 3 hrs.
Kinematics and kinetics, various coordinate systems, constitutive equations for continuous media; applications to solids, liquids, and gases. Prerequisites: ME/CHE 352, ME/CE 370. (Same as CE 671).

Theory of Elasticity 3 hrs.
Review of fundamentals. Formulation of boundary-value problems of classical elasticity. Application to plane problems, prismatic members, and axisymmetric problems. Introduction to three-dimensional problems. Prerequisite: ME/CE 671. (Same as CE 672).

Plasticity 3 hrs.
Fundamentals of mechanical behavior of metals and nonmetals for stress states greater than the yield stress state. Deformation and flow theories. Stress-strain relations and yield criteria. Solution of boundary value problems with plastic bodies. Limit analysis of structures. Prerequisite: ME/CE 671. (Same as CE 673).

Finite Element Analysis I 3 hrs.
Finite element theory, variational methods, weighted residuals; applications to linear partial differential equations in continuous media; solution of boundary-value and initial-value problems. Prerequisite: ME/CE 671. (Same as CE 674).

Viscoelasticity 3 hrs.

Experimental Stress Analysis 3 hrs.
Conventional methods for experimental stress analysis. Introduction to applied optics with emphasis on non-destructive, laser-based testing methods, fiber optic recording systems, photoelectronic-numerical data acquisition, and computer aided analysis. Prerequisite: ME/CE 577 (Same as CE 677). Lab Fee: Level 7.

Mechanics of Composite Materials 3 hrs.
Introduction to composite materials, micro and macromechanical behavior of laminae; bending, buckling and vibration of laminated plates. Prerequisites: ME/CE 671, 672. (Same as CE 678).

Graduate Seminar (same as CE 683). No Credit
Minimum one-term requirement of M.S.E. students in mechanical engineering and minimum three-term requirement of Ph.D. students in mechanical engineering.

Graduate Engineering Analysis I 3 hrs.
Linear algebra, matrices, and applications to system of differential equations, vector analysis, integral theorems, and introduction to tensor analysis. Prerequisite: MA 352.

Graduate Engineering Analysis II 3 hrs.
Fourier series, Fourier integrals, Laplace transformations, partial differential equations, boundary-value problems, and special functions. Prerequisites: MA 352, ME 692.

Master's Thesis 3 or 6 hrs.
Required each term in which a student is working and receiving direction on his master's thesis. Minimum of two terms and 6 hours required for M.S.E. students. A maximum of nine hours of credit is awarded upon successful completion of master's thesis.

Statistical Thermodynamics 3 hrs.
743 Direct Conversion of Energy 3 hrs.
Systems for direct conversion of heat to electricity including thermionic, magneto-
hydrodynamic, fuel cells, and semiconductor devices. Prerequisite: ME 641.

745 Combustion Theory 3 hrs.
Development of theory of chemical reactions in fluid flow, Shrab-Zeldovich formu-
lation, Rankine-Hugoniot relations, diffusion flames and droplet burning, laminar
flame, turbulent flame, solid propellant deflagration, combustion instability, spray
combustion, and chemical reactions in boundary layers. Prerequisite: ME 651. Lab
Fee: Level 7.

746 Convective Heat Transfer 3 hrs.
Advanced theory of convective transport processes in fluids, including transport of
momentum and energy in laminar flow, boundary layers and turbulent transport in
shear flow. Engineering applications include boiling and two phase processes. Pre-
requisite: ME 643. Lab fee: Level 7.

748 Radiative Transfer 3 hrs.
Physics and modeling of radiative transfer. Scattering, remote sensing, and absorp-
tion in participating media. Infrared through optical wave lengths. Computational
methods in radiative transfer. Prerequisite: Permission of instructor. Lab Fee: Level
7.

749 Mass Transport 3 hrs.
Mass transfer in solid and fluid systems under steady and transient conditions. Inte-
gration of momentum, heat and mass transfer equations with application to reactive,
theoretical and multicomponent systems. Prerequisites: ME 643, 651. Lab fee: Level
7. (Same as CHE 749).

750 Computational Fluid Dynamics IV 3 hrs.
Advanced topics in computational methods in heat transfer, turbulence, acoustics,
and reacting flows, special techniques for nonlinear and stiff equations, length and
time scales. Prerequisite: ME 653. Lab Fee: Level 5.

751 Boundary Layer Theory 3 hrs.
Development of boundary layers using singular perturbation theory. Curvature and
compressible effects and the order of their importance. Modern applications and com-
putational approaches. Prerequisite: ME 651. Lab fee: Level 7.

752 Mechanics of Rarefied Gases 3 hrs.
Application of kinetic theory to rarefied gas-flow problems. Boltzmann statistical
distribution; gas-surface interaction, transport properties, free molecule flow; heat-
free molecule flow; procedures for non-equilibrium flows.
Prerequisite: ME 651. Offered upon demand.

753 Magneto-Gas Dynamics 3 hrs.
Equations of motion for ionized gases with critical analysis of transport properties
in steady and varying electric and magnetic fields. MHD shock waves and radiation
effects. Prerequisite: ME 651.

754 Compressible Fluid Mechanics 3 hrs.
Fluid mechanics and thermodynamics of flows of ideal and real gases. Shock waves,
Prandtl-Meyer fans, wave interactions, method of characteristics, linearized theory
and shock-expansion method with applications to shock tubes, Laval nozzles, wind
tunnel, flows about wedges, cones, and supersonic thin airfoils. Prerequisite: ME 651.
Lab fee: Level 7.

755 High Speed Flow Theory 3 hrs.
Transonic, supersonic, and hypersonic flows. Compressible potential flows, simi-
ilarity rules, perturbation methods, and numerical methods for determining the flow
of ideal and chemically reacting gases about slender and blunt two-dimensional and three-dimensional bodies. Prerequisite: ME 754. Lab fee: Level 7.

**756 Numerical Simulations of Magnetohydrodynamics**  
3 hrs.  
Finite difference methods for simulation of MHD flows will be discussed. These methods include explicit scheme, FICE methods, LBL, ADI, artificial damping and projected characteristics for multidimensional time-dependent flow. Prerequisite: ME 753. Lab fee: Level 3.

**758 Turbulence**  
3 hrs.  
Turbulence in gases and liquids; boundary layers, atmospheric phenomena. Prerequisite: ME 656. Lab Fee: Level 5.

**759 Selected Topics in Mechanical Engineering**  
Credit to be arranged

**760 Analytical Methods in Nonlinear Dynamics**  
3 hrs.  
Application of averaging methods and perturbation methods to vibrations of nonlinear systems. Analysis of linear systems with periodic coefficients (Floquet theory). Elements of stability theory, Liapunov functions, and Liapunov's direct method. Prerequisite: ME 660 or 661.

**762 Wave Motion of Continuous Elastic Bodies**  
3 hrs.  
Elements of stress wave propagation in bounded elastic media. Propagation of elastic waves in infinite and semi-infinite bodies, cylinders, rods and beams. Prerequisite: ME 660. (Same as CE 762).

**765 Random Vibration of Elastic Systems**  
3 hrs.  

**768 Dynamics of Aerospace Vehicles**  
3 hrs.  
Elements of advanced rotational kinematics of rigid bodies. Attitude motion of space vehicles in circular and elliptic orbits. Methods of gravitation and spin stabilization of gyrost. Prerequisite: ME 660 or 661.

**772 Theory of Structural Stability**  
3 hrs.  

**773 Theory of Shells**  
3 hrs.  
Analysis of thin plates and shells including higher order approximation theories and transverse-shear deformations. Illustration of theories by selected problems. Prerequisite: ME 671. (Same as CE 773).

**774 Finite Element Analysis II**  
3 hrs.  
Advanced topics in finite element analysis; application to nonlinear partial differential equations in continuum mechanics; theoretical studies of convergence and stability of solutions. Prerequisite: ME 674. (Same as CE 774).

**778 Fracture Mechanics**  
3 hrs.  
Theory of crack propagation, stress intensity factors, series expansion, asymptotic approximations, field singularities, integral transforms, numerical solutions. Prerequisites: ME 671, 672. (Same as CE 778).

**780 Theory of Acoustics**  
3 hrs.
Basic properties of acoustic waves, reflection and transmission of sound, plane waves, spherical waves, cylindrical waves, sound emission, sound absorption, applications to industrial acoustic problems. Prerequisite: ME 671. Lab Fee: Level 5.

781 Nonlinear Effects in Plasma 3 hrs.
Fundamental physical concepts and methods of estimating various nonlinear interactions in plasmas. Both analytical and numerical methods to deal with these problems will be presented. Prerequisite: PH 531.

782 Plasma Turbulence 3 hrs.
The methodology that deals with plasma turbulence together with current numerical techniques to solve these problems approximately, via super-computing. Prerequisite: PH 531.

799 Doctoral Dissertation 3-6 hrs.

Materials Science

A Ph.D. degree, awarded jointly by The University of Alabama-Tuscaloosa (UA), The University of Alabama at Birmingham (UAB), and The University of Alabama in Huntsville (UAH) is available in Material Science. All requirements can be completed on the UAH campus. The participating faculty from the UAH campus are in the departments of Biological Science, Chemistry, Electrical Engineering, Mechanical Engineering (including the Chemical Engineering and Civil Engineering programs), and Physics. The program faculty have a major interest in production of new materials, in the application of materials to the needs of technology, and in materials processing. These interests currently fall into the following general curricular areas which are designated as options for specialization:

(1) Materials structure and properties
(2) Macromolecular materials
(3) Electronic, optical, and magnetic materials
(4) Materials processing
(5) Biomaterials
(6) Mechanical behavior of materials

Students entering the program are expected to have strong, but diverse undergraduate training. They will typically have bachelors' degrees in chemistry, chemical engineering, materials science, materials engineering, mechanical engineering, or physics. Students with interest in materials science and engineering are encouraged to refer to the complete description of the Materials Sciences doctoral program contained in the Interdisciplinary Section of this catalog.
The College of Liberal Arts provides educational experiences and programs of study in the major fields of the arts, humanities, and social sciences. These programs are designed to contribute to the personal and intellectual development of our students and to assist them in preparing for successful careers. These programs emphasize the development of communication skills, patterns of critical thinking, and problem solving capabilities. They contribute to the development of an understanding of the relationships within ourselves and others, and between ourselves and the elements of the physical and biological world in which we live.

The arts and the humanities, encompassing art, history, languages and literatures, music, and philosophy, lead to an understanding and appreciation of life as humankind had perceived it and as individuals have lived it. This study leads to a heightened critical faculty and a greater ability to use, evaluate and appreciate values and ideas, to be more effective in utilizing language and to the cultivation of taste. The study of the arts and the humanities is essential to a broad and sensitive awareness of humankind as it has been, is, and aspires to be.

The social sciences encompass the knowledge that deals with the behavior of humankind and the culture it has created, knowledge that becomes more necessary as the world grows more complex and interrelated. Social scientists perform a dual function, assembling and ordering complex systems of technical knowledge related to human relationships and providing a continual appraisal of the value systems in our society. The social science programs at UAH, history, political science, psychology, and sociology, are designed to prepare the student to value and perform both of these roles. Since these disciplines are concerned with a social milieu that it is both possible and desirable, the approach involves both the understanding and use of the scientific method and an appreciation of, and a sensitivity to, questions of values.

The College of Liberal Arts offers courses of study that provide its students with an in-depth study of at least one field in the liberal arts and sciences and the intensive professional training in the field of education that are needed for the teacher to meet the challenges of teaching in the modern world.

Throughout its curriculum, the College of Liberal Arts attempts to utilize and build upon the richness and diversity of our tradition and diverse talents of our faculty in preparing persons to be secure, productive, and successful in a free and humane society in a high technology age. Its goals are to aid in the development of more sensitive and successful scientists, more creative and powerful artists, and more disciplined students of the humanities. In sum, it is our desire to contribute to the individual's development as a well rounded and capable person and professional who is prepared to undertake successfully, and to provide leadership in effectively confronting, the many challenges of life.
Undergraduate Degrees and Study

The College of Liberal Arts awards a Bachelor of Arts degree. Each student must file an official program of study no later than the close of the sophomore year. This program of study must include a major and a minor or supporting cognate studies. The major must be chosen from the following disciplines: Art, Communication Arts, Education, English, Foreign Languages and International Trade, French, German, History, Music, Political Science, Psychology, Russian Studies, or Sociology. Besides these majors, courses are offered in Linguistics, Philosophy, Physical Education, Russian, and Spanish. The major will consist of a minimum of 30 semester hours in a program of study in a single department with at least 21 of these hours at the 300 level or above.

The supporting studies must include one of the following variations:

1. A minor drawn from any discipline with a minimum of 12 hours at the 300 level or above.
2. An approved cognate area of closely related courses approved by the major department with 12 semester hours at the 300 level or above. (See individual department programs for specific requirements of each minor or consult with an advisor in the major department for the development of an approved cognate area.)

Any minor chosen by a student is subject to approval by the department offering the minor. Any area of cognate studies chosen by a student is subject to approval of the chairman of the student’s major department. All programs of study are subject to approval by the dean of the College.

Arts, Humanities, and Social Sciences (AHS)

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<th>Course</th>
<th>Title</th>
<th>Hours</th>
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<tr>
<td>300</td>
<td>Statistical Analysis</td>
<td>4</td>
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<tr>
<td></td>
<td>Collection, classification, and presentation of social science data, measures of central tendency and dispersion, introduction to probability distribution and sampling theory, confidence limits and tests of significance, chi-square and ‘t’ distribution. Includes laboratory. Prerequisite: MA 105 or 119. Lab fee: Level 4.</td>
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<tr>
<td>392</td>
<td>Engineering Ethics and Professional Behavior</td>
<td>3</td>
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<td></td>
<td>Examination of ethical aspects of decisions made by engineers, including consideration both of the kinds of professional and organizational situations confronting the engineer and philosophic bases of choosing and evaluation. Examination of broader values and responsibilities of the engineer as a professional person. Prerequisite: junior standing.</td>
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Social Science (SS)

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<th>Course</th>
<th>Title</th>
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<tr>
<td>532</td>
<td>Space Orientation for Teachers: Social Science</td>
<td>3</td>
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<td>This course offers social studies teachers a unique and careful study of the historical, economic, political, and other dimensions of space-related activities, technologies, and discoveries.</td>
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<tr>
<td>642</td>
<td>International Aerospace Education: Soviet Union</td>
<td>3</td>
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<td></td>
<td>On-site seminar on the Soviet Space Program. Lectures deal with rocket and shuttle design, cosmonautics, Soviet Science Education and Space Policy decision-making. Locations include Space Mission Control, Star City, the Baikanur Cosmodrome, and various schools, institutes, ministries, and factories involved in aerospace education and industry in Moscow, Kiev, Leningrad, and Krasnoyarsk.</td>
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Graduate Degrees and Study

Graduate study in the College of Liberal Arts brings together faculty and advanced students to share the excitement of creative learning. All degree candidates plan a program of study with faculty members who share the student's intellectual interests. Within the framework of the requirements established by the Department and the School of Graduate Studies, students design, in consultation with a faculty advisor, a graduate program fitted to their particular interests and needs.

The College of Liberal Arts offers programs of study leading to the Master of Arts Degree with concentrations in English, History, Psychology, and Public Affairs. Class “A” teacher certification is available with concentrations in each of the areas of the arts and sciences in which the masters degree is awarded by the institution. Certification may be achieved through either traditional or non-traditional “fifth year” approaches.

Art and Art History Department

Associate Professors Crouse, Pope (Chair); Assistant Professors Dasher, Farr, Marchlinski, Stewart; Adjunct Assistant Professors Mikell, Milberger.

The Department of Art and Art History, an institutional member of the College Art Association and the Southeastern College Art Conference, offers a B.A. in art and art history. The UAH chapter of Kappa Pi, international art honorary fraternity, is Epsilon Tau. The student art club is FOCAL. The art program provides preparation not only for a life of cultural fulfillment, but for a professional career or graduate study in art.

Art and Art History Majors

The art curriculum is multifaceted, providing the possibility of teacher certification as well as a variety of programs leading to the baccalaureate degree. The department also offers courses intended either as introductory or skill-enhancing experiences in the art discipline. The Bachelor of Arts degree requires specialization in either art history or the studio arts. The art history curriculum, which prepares students for graduate work or museum-related careers, examines the various styles found in western art, emphasizing their relation to both personal experiences and cultural contexts. The studio curriculum includes a core program followed by two years of upper division work offering breadth and/or depth in the following concentrations: communication graphics, interior design, painting, photography/media, printmaking and sculpture.

The communication graphics concentration consists of courses in advertising layout, typographic and lettering design and commercial art processes. A free informative booklet, “Careers in Communication Graphics,” is available on request from the Department of Art and Art History. The interior design concentration is intended for persons preparing for work in this profession. The curriculum includes basic design, design analysis, and residential and commercial space planning. Technical development includes the basic knowledge of architectural structural planning, building equipment and components textiles, specifications, professional boards and ethics.

Previous art experience or aptitude is not a requirement for admission to the core program courses, and should not be considered a critical factor in those courses.

Studio courses require a laboratory fee and additional supplies to be secured by the student. Students who have financial aid or tuition assistance should include an amount for supplies and fees in their funding request. Most studio courses do not require textbooks; thus, the overall cost of course materials is not excessive.
Transfer Students
Art students transferring to UAH must submit information on previous training and representative samples of art work to the art faculty for evaluation before registration. Advanced placement in art courses will be determined by the art faculty. Transfer candidates for a degree with a specialty in art must take at least 12 semester hours of art courses at UAH numbered 300 or above. A student minoring in art must take 6 semester hours at the 300 level or above at UAH.
Selected examples of student art work may be retained in the permanent collection of the department.

Art for Non Majors
Students majoring in other departments are encouraged to consider various level art courses as electives. Development of one’s human faculties and understanding through art is universally recognized. All art courses are open to any UAH student.

Programs of Study for the Art Major
Three basic programs of study have been established for the degree candidates in art. They are Studio, Art History and the Studio Discipline with Teacher Certification.
I. The Studio Discipline
The program consists of a lower-division foundation core curriculum of nine courses which is designed to provide the basic vocabulary and syntax of the visual art language. The upper-division program is composed of eight courses offering the student the option of selecting broad studio experiences or specializing within a discipline. It is strongly advised that no more than two studio courses be taken in any one term.
A. Freshman – Sophomore Core Art Requirements
(27 semester hours or 21 semester hours when ARH 100 or ARH 101 are included in the cluster or minor)
1. Art Studio Requirements
ARS 120 – Two-Dimensional Form in Design 3 hrs.
ARS 121 – Color in Design 3 hrs.
ARS 140 – Three-Dimensional Design 3 hrs.
ARS 150 – Photography for Drawing and Design 3 hrs.
ARS 160 – Introduction to Drawing 3 hrs.
AND TWO OF THE FOLLOWING:
ARS 240 – Introduction to Sculpture 3 hrs.
ARS 250 – Intermediate Photography 3 hrs.
ARS 260 – Intermediate Drawing 3 hrs.
ARS 267 – Drawing for Design and Illustration 3 hrs.
ARS 270 – Introduction to Painting 3 hrs.
ARS 280 – Introduction to Printmaking 3 hrs.
2. Art History Requirements
ARH 100 – Art History Survey: Ancient to Renaissance 3 hrs.
ARH 101 – Art History Survey: Renaissance to Modern 3 hrs.
There are no prerequisites for ARH 100 and 101, ARS 120, 121, 140, 150 and 160 which introduce the student to the basic concepts and skills regarding the visual arts. Students planning to specialize in the Interior Design discipline must complete ARH 209.

180
B. Junior Level
(15 semester hours)

Five courses are required at the 300-level with no more than three courses to be taken in any one studio discipline. A student may elect to specialize in one discipline by taking three junior and three senior courses in that discipline.

- Interior Design — ARS 310, ARS 311, ARS 312 and ARH 209
- Communication Graphics — ARS 330, ARS 331 and ARS 332
- Sculpture — ARS 340, ARS 341, ARS 342 and ARS 346
- Photography/Media — ARS 350, ARS 351 and ARS 352
- Painting — ARS 375, ARS 376 and ARS 377
- Printmaking — ARS 380, ARS 381 and ARS 383
- Other — ARS 360 and ARS 390

To fulfill Junior level elective studio requirements, a student may take two art studio courses at Alabama A&M. These courses must be selected from ART 305 Beginning Ceramics; ART 306 Advanced Ceramics; ART 307 Beginning Jewelry; and ART 308, Advanced Jewelry.

C. Senior Level
(9 semester hours)

Senior level courses are to be taken only after the successful completion of a minimum of three 300-level studio courses or proper prerequisites. No other studio courses should be taken while completing senior requirements except in the areas of communication graphics and interior design.

Students electing to specialize in communication graphics must complete ARS 430, 431 and 432 which may be taken in any sequence, provided proper prerequisites are satisfied.

Interior design specialists must complete ARS 410, 411 and 412 in numerical sequence. All other studio students must complete three 400 level studio courses which may be taken in any sequence. (See details in course listings.)

D. Total Number of Hours

Students enrolled in the art studio program of study are required to complete 51 semester hours or 45 semester hours when ARH 100 and 101 are included in the minor or cognate studies.

Art History would be an appropriate minor for studio specialists.

Interior Design Program Termination

Beginning with the Fall Term 1990-91, new applications to the Interior Design program of the UAH Department of Art and Art History will no longer be accepted. The UAH art students currently in the Interior Design program will be offered the opportunity to complete their required ARS 310, 311, 312, 410, 411, and 412 during the 1990-91 and 1991-92 years, after which time these courses will no longer be offered and Interior Design will be permanently dropped from the UAH Department of Art and Art History offerings.

Students should therefore plan their schedules to take their I.D. courses as soon as possible.

II. Art History Discipline

Lower Division Program (27 semester hours)—During the first year ARH 100 and ARH 101 should be completed. One course at the 200-level and two courses at the 300-level should be completed during the second year. During the first two years 9 hours of studio courses (3) at the 100-level and a 3-hour studio course at the 200 level should be selected in consultation with the art history advisor. The 3 courses at the 100-level must be from three different studio disciplines.
Upper Division Program (15 semester hours)—During the junior year three additional art history courses at the 300-level should be completed. Two courses in art history at the 400-level or above should be completed during the senior year. An 18-hour minor or 21-hour cognate studies program is required. All courses for the minor or cognate studies must be taken outside of the Department of Art History.

III. Studio Discipline with Teacher Certification

The program for teacher certification available to art degree candidates offers the qualifications for teaching art in Alabama's nursery through secondary schools. General education requirements for certification differ from those of the preceding programs. The student should consult the catalog description for the Department of Education for GER specific professional courses, and information relevant to the program outlined below.

A. Required Studio Courses:
ARS 120 Two Dimensional Form in Design
ARS 121 Color in Design
ARS 140 Three Dimensional Design
ARS 150 Photography for Drawing and Design
ARS 160 Introduction to Drawing
ARS 240 Introduction to Sculpture
ARS 280 Introduction to Printmaking
ARS 375 Traditional Oil Painting Techniques
ARS 380 Printmaking: Intaglio

B. Advised Electives (choose two)
ARS 351 Photography: Audio-Visual and Film Application
ARS 376 Contemporary Painting Approaches
ARS 383 Screenprinting
ARS 330 Fundamentals of Advertising Design

C. Choose one:
ARS 340 Sculpture: Additive Process
ARS 346 Sculpture: Figure Modeling

D. Required Art History Courses:
ARH 100 Art History Survey: Ancient to Renaissance
ARH 101 Art History Survey: Renaissance to Modern

E. Advised Electives (choose three)
ARH 300 Colonial & 19th Century American Art
ARH 303 Renaissance
ARH 304 Twentieth Century Art
ARH 306 Baroque and Rococo

Minors and Cognate Studies Programs

1. Art History Minor
A total of 18 hours is required. Required courses are ARH 100 and ARH 101. In addition, one (1) art history course at the 200-level and three courses at the 300-level or above are required.

2. Art History Cognate
A total of 21 hours is required. Required courses: ARH 100 and ARH 101. A minimum of three (3) art history courses at the 300-level or above are required. Two courses in related disciplines must be selected at the 300-level, to be approved by the departments concerned.
3. Art for Second Area of Study (with Elementary Education)

Required courses: (choose three) ARS 120, ARS 121, ARS 140, ARS 150, ARS 160 and ARS 280. Choose four additional courses from ARS 340, ARS 346, ARS 351, ARS 375, ARS 376 or ARS 380. ARH 100 or ARH 101 should be taken to fulfill the general studies requirement for the Elementary Education Program.

4. Studio Art Minor or Cognate for Non-Art Majors

Any student majoring in another area but desiring to pursue a minor in art is encouraged to do so regardless of previous experience or perceived aptitude. The program must total 18 semester hours of which 12 must be at the 300-level. The minor program will be tailored to best serve the needs and interests of the student; however, a typical studio-oriented minor would be as follows: one 100-level studio course, one 200-level studio course and four studio courses at the 300-level or above. A cognate study consists of 21 hours of which 12 must be 300-level or above.

UAH Galleries of Art

The Department of Art and Art History currently sponsors art exhibitions and events in two galleries at UAH. The Old Church Gallery, which was erected circa 1890 in a style reminiscent of Greek Revival, was donated to the University by Mr. and Mrs. Franklin Bendall in 1973, at which time it was relocated to its present location on the UAH campus.

The University Center Art Gallery, located off the main lobby of the UAH University Center, offers additional exhibition space in a contemporary environment. Both galleries are operated with the assistance of a student staff.

UAH Visiting Artist Series

The Department of Art and Art History sponsors campus visits of distinguished artists, critics, and art historians. Presentations include studio and classroom sessions as well as public lectures.

The FOCAL Exhibition

The UAH student art organization, FOCAL, in conjunction with the Department of Art and Art History sponsors a biennial regional juried exhibition for college art students of the southeastern states.

Art Studio (ARS)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>Two-Dimensional Form in Design</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>121</td>
<td>Color in Design</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>140</td>
<td>Three-Dimensional Design</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>150</td>
<td>Photography for Drawing and Design</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>160</td>
<td>Introduction to Drawing</td>
<td>3 hrs.</td>
</tr>
</tbody>
</table>
215 Art for Elementary Teachers 3 hrs.
Art methods and media presented by lecture, demonstration, discussion, reading, and studio experience for elementary school teachers. Does not satisfy departmental core requirements. Lab fee: Level 3.

240 Introduction to Sculpture 3 hrs.
Introduction to basic sculptural concepts and materials. Lab fee: Level 3. Prerequisites: ARH 100 or 101 and two studio courses at the 100-level or approval of instructor.

250 Intermediate Photography 3 hrs.
Personal exploration of photography as a fine arts medium with emphasis on production of finished works. Prerequisites ARH 100 or 101 and two studio courses at the 100 level or approval of instructor. Lab fee: Level 3.

260 Intermediate Drawing 3 hrs.
Development of drawing skills and individual expression through the study and practice of selected drawing approaches. Lab fee: Level 3. Prerequisites: ARH 100 or 101 and two studio courses at the 100-level or approval of instructor.

267 Drawing for Design and Illustration 3 hrs.
Drawing techniques for illustration. Expressive and objective drawing styles in professional media. Freehand sketching, perspective studies, rendering techniques, and composition in line, form, value, and color. Required for interior design students and recommended for communication graphics discipline. Prerequisites: ARH 100 or 101 and two studio courses at the 100-level or approval of instructor. Lab fee: Level 3.

270 Introduction to Painting 3 hrs.
Studio practice in painting. Development of individual creative expression, through a variety of contemporary and traditional painting approaches. Prerequisites: ARH 100 or 101 and two studio courses at the 100 level or approval of instructor. Lab fee: Level 3.

280 Introduction to Printmaking 3 hrs.
Basic printmaking techniques and processes used for generating ideas and images. Monoprint, relief prints, collagraph, and nontraditional approaches to printmaking. Prerequisites: ARH 100 or 101 and two studio courses at the 100-level or approval of instructor. Lab fee: Level 3.

Upper Division

310 Introduction to Interior Design 3 hrs.
Basic design terms and styles of furniture. Introduction to design principles; furniture arrangements; elements of color, window treatments, accessories and lighting; consumer buying of furniture and floor and wall coverings. Prerequisites: ARH 100 or 101 and three studio courses at the 100-level or approval of instructor. Lab fee: Level 3.

311 Applications of Interior Design 3 hrs.
Principles and practices of interior design; activities and space planning; color schemes and theory; interior materials and design of major interior elements. Designing and developing the floor plan or the entire house including basic materials and furniture arrangement; exterior design and cost factors. Prerequisites: ARS 310 or approval of instructor. Lab fee: Level 3.

312 Interior Design: Introductory Architectural Planning 3 hrs.
Survey of architectural planning and drawing, primarily as these topics relate to interior decoration. Basic drawing and sketching; planning processes for home and
light-commercial buildings; construction materials; elements of construction methods; introduction to preparation of architectural drawings. Prerequisites: ARH 100 or 101 and three studio courses at the 100-level or approval of instructor. Lab fee: Level 3.

330 Fundamentals of Advertising Design 3 hrs.
Introduction to the tools, techniques, and practices of the professional artist in the advertising agency. Preparation of art and photography for reproduction in newspaper and magazines. Functional lettering techniques. Prerequisites: ARH 100 or 101 and three studio courses at the 100-level or approval of instructor. Lab fee: Level 3.

331 Advertising and Typographic Design 3 hrs.
Instruction in the basic skills required of the contemporary graphic designer. Trademark and corporate identity programs. Preparation of full color comprehensives and camera ready art. Prerequisites: ARH 100 or 101 and 3 studio courses at the 100 level or approval of instructor. Lab fee: Level 3.

332 Illustration in Black and white 3 hrs.
The design and production of one color art for the print media using gouache, ink, ink wash, pencil and other commercial drawing materials. Advanced illustrational and rendering techniques. Practical experience in preparing illustrations for publication by offset lithographic reproduction. Prerequisites: ARH 100 or 101 and three studio courses at the 100-level or approval of instructor. Lab fee: Level 3.

Emphasis on the creation of original work using additive sculptural processes and materials. Prerequisites: ARH 100 or 101 and three studio courses at the 100-level or approval of instructor. Lab fee: Level 3.

341 Sculpture: Subtractive Process 3 hrs.
The creation of original work through the sculptural use of subtractive processes and materials. Prerequisites: ARH 100 or 101 and three studio courses at the 100-level or approval of instructor. Lab fee: Level 3.

342 Sculpture: Casting 3 hrs.
Approaches to the production of cast sculpture. Casting materials, such as plaster, wax, or metals. Prerequisites: ARH 100 or 101 and three studio courses at the 100-level or approval of instructor. Lab fee: Level 3.

346 Sculpture: Figure Modeling 3 hrs.
Exploration of the human form utilizing various sculpture mediums. Prerequisites ARH 100 or ARH 101 and three studio courses at the 100 level or approval of instructor. Lab fee level: 3.

350 Advanced Photography 3 hrs.
Advanced use of black/white and color photography as a fine art. Emphasis on personal expression. Prerequisites: ARH 100 or 101 and 3 studio courses at the 100-level or approval of instructor. Lab fee: Level 3.

351 Photography: Audio-Visual and Film Applications 3 hrs.
Individual and group production of video projects. Field trips to professional production facilities assure familiarity with current developments. Prerequisites: ARH 100 or 101 and three studio courses at the 100-level or approval of instructor. Lab fee: Level 3.

352 Non-Silver Photography 3 hrs.
Investigation and use of alternative processes such as gum-bichromate, xerography and related media to produce works of photographic art. Prerequisites: ARH 100 or 101 and three studio courses at the 100-level or approval of instructor. Lab fee: Level 3.
Advanced Drawing 3 hrs.  
Drawing with both traditional and contemporary methods and materials encouraging the development of personal expression. Prerequisites: ARH 100 or 101 and three studio courses at the 100-level or approval of instructor. Lab fee: Level 3.

Traditional Oil Painting Techniques 3 hrs.  
Essentially representational painting with techniques ranging from underpainting and glazing to alla-prima oils. Prerequisites: ARH 100 or 101 and three studio courses at the 100-level or approval of instructor. Lab fee: Level 3.

Contemporary Painting Approaches 3 hrs.  
Direct personal expression on canvas, through both spontaneous and deliberate handling of acrylic tempera and other painting media. Prerequisites: ARH 100 or 101 and three studio courses at the 100-level or approval of instructor. Lab fee: Level 3.

Painting with Mixed and Non-Traditional Media 3 hrs.  
Individual expression involving use of mixed wet and dry materials, assemblage, collage, shaped and contoured canvases and related media. Prerequisites: ARH 100 or 101 and three studio courses at the 100-level or approval of instructor. Lab fee: Level 3.

Printmaking: Intaglio 3 hrs.  
Beginning studio practice in etching, engraving, aquatint, photo-etching and dry-point. Prerequisites: ARH 100 or 101 and three studio courses at the 100-level or approval of instructor. Lab fee: Level 3.

Printmaking: Lithography 3 hrs.  
Beginning studio practice in autographic and photographic lithography processes utilizing aluminum plate and stone. Prerequisites: ARH 100 or 101 and three studio courses at the 100-level or approval of instructor. Lab fee: Level 3.

Printmaking: Screenprinting 3 hrs.  
Introduction to silkscreen processes, including the latest professional handcut film and photographic methods. Recommended for communication graphics students. Prerequisites: ARH 100 or 101 and three studio courses at the 100-level or approval of instructor. Lab fee: Level 3.

Mixed Media 3 hrs.  
Study and practice of art approaches which combine elements of various art forms such as design, painting or photography/film and may include elements otherwise foreign to the visual arts, such as theatrical or industrial processes and materials. Prerequisites: ARH 100 or 101 and three studio courses at the 100-level or approval of instructor. Lab fee: Level 3.

Senior level studio courses are to be taken only after the successful completion of a minimum of three 300-level studio courses or the proper prerequisites. Communication graphics specialists must complete ARS 430, 431, and 432 which may be taken in any sequence. Interior design specialists must complete ARS 410, 411 and 412. ARS 411 and 412 must be in the same quarter. All other studio students must complete three 400 level studio courses which may be taken in any sequence; however, no other studio courses should be attempted while completing these courses. Enrollment in these 400 level courses is by permission of instructor only.

Textiles in Interior Design 3 hrs.  
Textiles, emphasizing fibers, yarns, fabric construction, and finishes in relation to use, serviceability and care in residential and commercial applications. Prerequisite: Upper division standing. Lab fee: Level 3.

Interior Design: Advanced Residential and Commercial Design 3 hrs.  
Advanced development of skills in residential and commercial planning and draw-
ing relating to interior design. Development of residential and commercial floor plans, kitchen fixture planning, bathroom and restroom facilities, restoration, fire code material resistance, lighting specifications, space planning and presentation techniques. Prerequisites: ARS 310, 311, 312, and 410, and should be taken in the same quarter as 412. Lab fee: Level 3.

412 Advanced Application of Interior Design Principles 3 hrs.
Analysis and solution of interiors of advanced complexity. Practicum in residential and commercial design in combining furniture, accessories, materials, textiles and finishes. Professional practices and ethics. Development of a portfolio. Prerequisites: ARS 310, 311, 312, 410 and should be taken in the same quarter as 411. Lab fee: Level 3.

430 Advanced Studio Problems in Communication Graphics:
Advertising Layout and Design 3 hrs.

431 Advanced Studio Problems in Communication Graphics:
Graphic and Corporate Design 3 hrs.
Type design fundamentals. History and practice of typography. Advanced layout and design techniques for four color publications. Preparation of portfolio projects. Prerequisite: ARS 331. Lab fee: Level 3.

432 Advanced Studio Problems in Communication Graphics:
Illustration in Color 3 hrs.
Design and execution of full color art for reproduction. Professional airbrush painting techniques for rendering and illustration. Four color art reproduction processes. Prerequisite: ARS 332. Lab fee: Level 3.

440, 441, 442, 446, 450, 451, 452, 475, 476, 477, 480, 481, 483 are advanced senior level studio courses, and are offered simultaneously with their scheduled 300 level counterparts. Admission by approval of instructor only. Lab fee: Level 3.

490 Honors Project 3 hrs.
Independent work in studio leading to a solo exhibition. Course must be followed by ARS 491. TBA.

491 Honors Project 3 hrs.
Independent work in studio leading to solo exhibition in last term of senior year. Prerequisite: ARS 490. TBA.

493 Advanced Mixed Media 3 hrs.
Offered simultaneously with scheduled ARS 390. Approval of instructor only. Lab fee: Level 3

495 Technical Problems 3 hrs.
Technical problems in studio disciplines for which advance courses are not available. Course can be repeated for a total of 6 hours credit. Prerequisites: Advanced standing in studio disciplines concerned and permission of instructor. TBA.

Art History (ARH)

100 Art History Survey: Ancient to Renaissance 3 hrs.
Major monuments, periods and movements in the history of art from the caves of Lascaux to the revival of classical art in Renaissance Italy. Fundamentals of art historical inquiry.

101 Art History Survey: Renaissance to Modern 3 hrs.
Designed to acquaint the student with developments in art since the Renaissance. Major themes, artists and critical issues will be examined.
<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>102</td>
<td>History of Architecture</td>
<td>3 hrs.</td>
<td>A survey of architectural styles from the classical period to the present.</td>
</tr>
<tr>
<td>201</td>
<td>Contemporary Art &amp; Issues</td>
<td>3 hrs.</td>
<td>Major movements since World War II, including abstract expressionism, color field painting, pop art, conceptual art, minimalism, earthworks, performance art and video, new realism and photo-realism, neo-expressionism and graffiti. Prerequisites: ARH 100 and 101 or approval of instructor.</td>
</tr>
<tr>
<td>209</td>
<td>The History of Design</td>
<td>3 hrs.</td>
<td>A survey of the historical development of European and American interior design styles including Victorian, the Arts and Crafts Movement, Art nouveau, the Bauhaus, and contemporary trends. Prerequisites: ARH 100 and 101 or approval of instructor. Required for Interior Design Specialists.</td>
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**Upper Division**

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<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>Colonial and Nineteenth Century American Art</td>
<td>3 hrs.</td>
<td>American art, architecture and design prior to World War I. Emergence of a national style and its relationship to European art. Prerequisites: ARH 100 and 101 or approval of instructor. Prerequisites for non-majors and non-minors are HY 101, 102 and EH 205, 206 or EH 240, 241.</td>
</tr>
<tr>
<td>303</td>
<td>Renaissance Art</td>
<td>3 hrs.</td>
<td>The art of Europe from 1250 to 1527. The rise of the artist as a creative individual, and his expanding role in society. The works of such northern and southern masters as Van Eyck, Durer, Da Vinci, Michelangelo, and Titian will be studied. Prerequisites: ARH 100 and 101 or approval of instructor. Prerequisites for non-majors and non-minors are HY 101, 102 and EH 205, 206 or EH 240, 241.</td>
</tr>
<tr>
<td>304</td>
<td>Twentieth Century Art</td>
<td>3 hrs.</td>
<td>A survey of the developments in Europe and America from 1890 to World War II. Major movements including Cubism through Dada and Surrealism, to abstract expressionism. Prerequisites: ARH 100 and 101 or approval of instructor. Prerequisites for non-majors and non-minors are HY 101, 102 and EH 205, 206 or EH 240, 241.</td>
</tr>
<tr>
<td>306</td>
<td>Baroque and Rococo Art</td>
<td>3 hrs.</td>
<td>Development of baroque and rococo art in Europe. Architecture of Borromini, sculpture of Bernini, painting of Rubens, Rembrandt, Velasquez, Poussin and Watteau will be examined. Prerequisites: ARH 100 and 101 or approval of instructor. Prerequisites for nonmajors and non-minors are HY 101, 102 and EH 205, 206 or EH 240, 241.</td>
</tr>
<tr>
<td>310</td>
<td>Nineteenth Century Art in Europe</td>
<td>3 hrs.</td>
<td>Survey of developments in art from 1780 to 1890: neo-classicism, romanticism, realism, impressionism and symbolism will be studied through the works of such artists as David, Goya, Courbet, Van Gogh and others. Prerequisites for non-majors and non-minors are HY 101, 102 and EH 205, 206 or EH 240, 241.</td>
</tr>
<tr>
<td>320</td>
<td>Special Topics in Art Since the Renaissance</td>
<td>3 hrs.</td>
<td>Special topics in art history since the Renaissance period as offered. Senior-level courses involve independent initiative of the degree candidate. The student should have completed all foundation courses and all GER before commencing senior program. ARH 400 and 500 include discussion and guided research on artists, works of art, and subjects closely related to art. Prerequisites: 100 or 101 or approval of instructor.</td>
</tr>
</tbody>
</table>
400  Art History Seminar: Special topics  3 hrs.
Methods of developing a scholarly research paper on special topics in art history as offered. Prerequisites: upper-division standing or approval of instructor. TBA.

500 Special Problems in Art History  3 hrs.
Directed reading and research. Prerequisites: Advanced standing, 12 semester hours of art history, previous course work in area to be studied, and approval of the instructor.

Communication Arts Department
Assistant Professor and Acting Chair Roach; Assistant Professors D. Whillock and R. Whillock; Instructors Kaylor, Langford, Fredericksen, Fillippeli.

The Department of Communication Arts offers a comprehensive program of study leading to a Bachelor of Arts (B.A.) degree. The program is designed to provide students with a core background in the intellectual foundations of the power of speech, including historical, theoretical, and critical work in rhetoric, and to study strategies for creating and evaluating influence in a wide variety of communication situations, including relational, organizational, public, and mass communication settings.

Major in Communication Arts
A major in Communication Arts consists of 36 hours of coursework within the department, at least 21 hours of which must be at or above the 300 level. Students are encouraged to work closely with a faculty advisor to plan a program of study.
Eighteen (18) of the thirty-six (36) hours within the department are core requirements and must be completed by all majors. These courses are
CM 113 (Introduction to Rhetorical Communication)
CM 230 (Mass Media in America: Theory and Criticism)
CM 250 (Interpersonal Communication)
CM 309 (History of Rhetoric)
CM 310 (Persuasion)
or CM 315 (Argumentation and Debate)
CM 431 (Senior Seminar in Communication Arts)

A major in Communication Arts can also include approved coursework in allied disciplines. For example, students may select a technical writing course (EH 300), a course in civil liberties (PSC 471), a course in graphic art (ARS 330, 331) or an independent study in any discipline germane to the study of communication arts. To elect this option, a student must secure permission of the chair of the department.

Minor in Communication Arts
A minor in Communication Arts consists of twenty-one (21) hours of coursework taken within the department, at least twelve (12) hours of which must be taken at or above the 300 level. Nine (9) hours of coursework must be completed by all minors: CM 113 (Introduction to Rhetorical Communication); CM 230 (Mass Media in America: Theory and Criticism); and one history of communication course selected from CM 309 (History of Rhetoric), CM 322 (History of Theatre), or CM 333 (History of International Cinema).
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>110</td>
<td>Voice and Diction</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Introductory course of language, speech, and hearing. Development of individual vocal skills. Offered alternate years. (Does not satisfy College of Engineering HU/SS requirement.)</td>
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<tr>
<td>113</td>
<td>Introduction to Rhetorical Communication</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Study of rhetorical theories and practice of public communication. Prerequisite: EH 101 or 105. (Does not satisfy College of Engineering HU/SS requirement.)</td>
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<tr>
<td>122</td>
<td>Theatre Appreciation</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>An introductory survey of theatre art focusing on understanding performance components and genres.</td>
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<tr>
<td>201</td>
<td>News Writing</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>214</td>
<td>Oral Performance of Literature</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Study and practice in intellectual, artistic, and communication skills required to read prose, poetry, and drama aloud effectively. Prerequisite: CM 110 or CM 113, or approval of instructor. Summer term only.</td>
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<tr>
<td>230</td>
<td>Mass Media in America: Theory and Criticism</td>
<td>3 hrs.</td>
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<td></td>
<td>Mass communication theory, history of American mass media, and criticism of contemporary forms and functions of mass communication in the United States. (Same as SOC 230).</td>
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<tr>
<td>240</td>
<td>Communication Arts Practicum</td>
<td>1 hr.</td>
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<td></td>
<td>Credit for execution of major responsibility in communication arts activities under faculty supervision. May be repeated up to three times. Prerequisite: Approval of communication arts faculty before registration.</td>
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<tr>
<td>250</td>
<td>Interpersonal Communication.</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Study of interpersonal skills, including listening, empathy, conflict resolution, and building and maintaining relationships. Prerequisite: CM 113 or approval of instructor. Spring term only.</td>
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</tr>
<tr>
<td>251</td>
<td>Decision-Making in Small Groups</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Introduction to the theories and techniques of group discussion and decision-making emphasizing the skills of leadership, participation, and oral presentation. Offered alternate years. Prerequisite: CM 113.</td>
<td></td>
</tr>
<tr>
<td>301</td>
<td>News Editing</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Standard symbols and copy-editing techniques, headline writing, and unit counts. Techniques of cover layout and page design. Prerequisite: CM 201 or approval of instructor. (Does not satisfy College of Engineering HU/SS requirement.) Lab fee: Level 4.</td>
<td></td>
</tr>
<tr>
<td>309</td>
<td>History of Rhetoric</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>History of rhetoric and persuasion from ancient Greece and Rome through late 19th century. Prerequisite: CM 113 or approval of instructor.</td>
<td></td>
</tr>
<tr>
<td>310</td>
<td>Persuasion</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Principles and practices in persuasive communication, emphasizing observation and analysis of persuasive events on qualitative and quantitative levels. Prerequisite: Junior standing.</td>
<td></td>
</tr>
<tr>
<td>311</td>
<td>Interviewing in Organizations</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Study and practice of interviewing with emphasis on employment and appraisal settings. Prerequisite: Junior standing.</td>
<td></td>
</tr>
</tbody>
</table>
315 Argumentation and Debate 3 hrs.
Theory and practice of argumentation and debate. Argumentation is examined as a mode of inquiry for presenting the processes by which people give reasons to justify their acts, beliefs, and values. Prerequisite: CM 113 or approval of instructor.

322 History of Theatre 3 hrs.
Explores the development of the theatre art form. Periods discussed include Ancient Greece and Rome, Elizabethan England, Neoclassic, Modern and Contemporary. Offered alternative years. Prerequisite: CM 122 or approval of instructor.

330 Psychology of Communication 3 hrs.
A study of various theories, problems, and research in the areas of interpersonal, nonverbal, and mass communication, formulating a psychological conception of humans as information-gathering and information-processing systems. Prerequisite: 3 hours in Communication Arts.

333 History of International Cinema 3 hrs.
Course investigates cinematic understanding of aesthetics and trends in an international historical context (1895 to present). Prerequisite: CM 230 or approval of instructor.

334 History of American Cinema 3 hours
Course investigates the American Cinema as a cultural artifact by studying cultural and historical context of the cinematic representations, aesthetics and trends in American cinema from its beginnings (1895 to present). Prerequisite: 333 or approval of instructor.

340 Special Topics in Communication Arts 3 hrs.
Topics announced in advance. Open to students who have completed nine hours of coursework in communication arts. May be repeated twice for credit.

350 Organizational Communication 3 hrs.
Investigation of formal and informal communication in organizations. Emphasis is on the relational and cultural forces affecting communication in corporations and government agencies.

410 Political Communication 3 hrs.
Investigation of the role communication plays in the political process. Course examines the theories of communication and assesses their application in both election strategies and political maintenance functions. Prerequisites: CM 113.

413 Business and Professional Speaking 3 hrs.
Intensive investigation of communication theories and skills involved in the design, delivery, and evaluation of business, technical, and professional speeches. Examines individual and group presentations typically encountered in organizations. Discusses speechwriting techniques. Prerequisite: CM 113.

415 Contemporary American Public Address 3 hrs.
Examines public address in America during the 20th century. Applies principles of rhetorical criticism to analyze selected examples and trends in public communication. Offered alternate years. Prerequisite: CM 309 or CM 310.

431 Senior Seminar in Communication Theory and Research 3 hrs.
Required of all majors. Research and public presentation of original work demonstrating the ability to carry out a complete scholarly project. Prerequisite: 15 hours of communication arts coursework and senior standing. Offered spring term only.

433 Critical Methods in Film and Television Analysis 3 hrs.
Explores various methodologies and develops academic critical thinking about film and television. Prerequisites: CM 230, 333, or approval of instructor.
450 Studies in Organizational Communication 3 hrs.
Examines various research methods and findings in the interpretive tradition. Special emphasis on investigations of symbolic inducement of meanings and ways in which the research and writing processes reflect them. Offered alternate years. Prerequisites: CM 350 and senior standing.

636 Seminar in Organizational Communication 3 hrs.

Education Department
Associate Professors Brindley, Gibson, Assistant Professors Allen, Butts (chairman), Piersma. Graduate and undergraduate programs are offered by the department.

Undergraduate Study in Education
Students who wish to major in teacher education and qualify for teacher certification should contact the chair of the Department of Education to be assigned an advisor as early as the freshman year. Students must also consult advisors from other approved academic departments to coordinate planning of programs of study. The Nursery-Grade 12 certification programs are available only in art and music.

Admission to the Teacher Education Program
During the sophomore year, students should apply for admission to the Teacher Education Program. Transfer students who have completed two years of undergraduate study must submit the application after completion of nine semester hours of work at UAH. Applicants must: (1) have a cumulative GPA of 2.50 on all work attempted, (2) have completed at least 70% of the GER, (3) have presented acceptable confidential evaluations prepared on proper forms, (4) have satisfactory performance on the Alabama State Department of Education English Language Proficiency Test, (5) have satisfactory interview(s) with representatives of the Department of Education, and (6) have a minimum score of 16 on the old ACT taken within five years prior to admission or 17 on the new ACT or equivalent SAT scores. Students may elect to be re-examined on all tests. (7) Students must successfully complete (with a grade of "C" or higher) ED 230, or 261, or 263 (or equivalent courses) before admission to the teacher education program.

Note: Students who began collegiate study prior to June 1, 1977, may have items (4) and (6), as listed above, waived. Students who have not been accepted into the teacher education program may not have accumulated more than 12 semester hours of coursework in education. Courses taken beyond the 12 hour limit may not be counted toward certification. No student will be approved for a major or a minor in education without being admitted to the teacher education program.

All students admitted to the program will have a teacher education advisor assigned to them, as well as an advisor in the teaching field(s).

Application for Student Teaching
Students must apply for student teaching at least two academic terms before the term requested. For example, students who plan to student teach during the Fall term must apply prior to the beginning of the preceding Spring term. The following criteria must be met before the internship assignment is made: (1) a GPA of 2.50 on all work attempted, (2) a GPA of 2.50 on all work attempted in the teaching field(s), (3) a GPA of 2.50 in all work attempted in education courses, with no grade lower than a "C", and (4) satisfactory completion of all appropriate general education requirements.
Initial Certification

Near the end of the teacher education program, a student who wishes to apply for an Alabama teaching certificate should complete the Alabama State Department of Education certification application in the Education Department office.

To be recommended for the teaching certificate a student, in addition to fulfilling the general degree requirements, must satisfactorily complete an approved program with at least a 2.50 GPA on all work attempted and at least a 2.50 GPA on all work attempted in the teaching field(s) and in professional education.

Additionally, the student must pass a comprehensive examination.

Successful completion of the bachelor's program in teacher education leads to Alabama Class B certification which is valid for eight years. This certification may be renewed upon verification of successful teaching for four of the eight years and completion of an approved professional development program; or earning upper division or graduate level credit in the certification areas. Teachers are encouraged to earn Class A certification which may be incorporated into their employer's professional development program.

Students seeking certification in other states may have to meet the specific requirements of those states. Some states have reciprocity with Alabama through interstate agreements of the State Departments of Education.

General Education Requirements (B.A.)

English Composition (EH 101 and EH 102) ................................................................. 6
Survey of Literature (EH 205 and EH 230) ................................................................. 6
Foreign Languages (two courses at 200 level or placement at that level) ................... 6
Origin and Development of the Contemporary World (HY 101 and HY 102) ............... 6
Fine Arts (ARH 100 or ARH 101 or ARS 110 or MU 100 or MU 110 or CM 122) .......... 3
Lower Division Humanities Course (PHL 101 or any humanities course at the 200 level chosen from English, Philosophy — excluding PHL 201 — or History) Course must be outside major and minor except for teacher education students ................................................................. 3
Upper Division Humanities or Fine Arts Elective. Chosen from English (excluding EH 300, EH 301, and EH 302), History, Philosophy, Art, Music, Foreign Languages (Literature Courses only), or Communication Arts (CM 309 or CM 322). Course must be outside major or minor except for teacher education students ................................................................. 3
Mathematics. One course at Level II or above ................................................................... 3
Laboratory Science. Two courses in a single discipline and one course in a second laboratory science discipline. The choices must include some biological and some physical science. (BYS, AST, CH PH, or ES) ................................................................. 12
Social Sciences. (PSC 101, and EC 142, or EC 143) Teacher education students must take at least one EC course and may substitute ED 230 and ED 263 for two of these courses. Four courses must be taken ................................................................. 12
Upper division Social Science Elective. Chosen from Political Science, Sociology, Psychology, or Economics. ................................................................. 3
Additional Requirements. Students who complete all requirements for teacher certification may take either ED 360 (for elementary education students) or ED 510 (for secondary education students) ................................................................. 3
HPE (Including HPE 294) ............................................................................. 3

General Education Requirements (B.S.)

English Composition (EH 101 and EH 102) ....................................................... 6
Survey of Literature (EH 205 and EH 230) .......................................................... 6

Foreign Language and Communication Skills:
(a) two MFL courses at the 200 level ............................................................... 6
or (b) three courses in communication skills (CS 108 or CS 113; CM 113; EH 301) ................................................................. 9

Origin and Development of the Contemporary World
(HY 101 and HY 102) ....................................................................................... 6

Fine Arts (ARH 100 or ARH 101; ARS 110; MU 101 or MU 110; PHL 101 or PHL 202 or PHL 311) ................................................................. 6

Social and Behavioral Sciences: Economics, Political Science, Psychology, or Sociology. Six semester hours must be taken in one discipline. ................................................................. 6
Teacher education students must take at least one Economics course and PSC 101 ................................................................. 9

Mathematics. One course at Level III or above .................................................. 3

Laboratory Science and Technical Studies:
Note: Laboratory sciences are — Astronomy, Biological Science, Chemistry, Environmental Science, and Physics.
(a) Two courses in a single laboratory science, outside of major/ minor, ................................................................. 8
and
(b) Coursework (to include at least one laboratory science course) in any department or program (outside of major/ minor) in the Schools of Science and Engineering ................................................................. 7-8
Note: Teacher education students must have within major/ minor and/or general education requirements, work in both biological and physical sciences. HPE (Including HPE 294) ................................................................. 3

ELEMENTARY EDUCATION

The curriculum in elementary education provides a broad liberal education base and professional studies, including the study of a single discipline. It prepares the elementary teacher for the general responsibilities expected of all teachers and the specific competencies of the elementary classroom. In addition, this curriculum provides a base for movement into the middle school, if the teacher so desires.

Because of the scope of the elementary education program the student must inform the Education Department of his/her goals as early as possible. The student will be assigned an advisor
to aid in planning an effective course of study. This planning also requires the student to seek counseling from an adviser in the department of the student’s cognate area of study.

Upon successful completion of the elementary education program, the student will be awarded a B.A. degree, will be recommended for the Alabama Class B Elementary Professional Teachers Certificate, and will be qualified to teach in grades 1-6.

Course Requirements for an Elementary Education major:
General Education Requirements (See B.A., above.)

**Major**

**Program of Study — Elementary Education**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARS 215</td>
<td>Art for Elementary Teacher</td>
<td>3</td>
</tr>
<tr>
<td>MU 215</td>
<td>Music for Elementary Teacher</td>
<td>3</td>
</tr>
<tr>
<td>ED 215</td>
<td>P.E. for Elementary Teacher</td>
<td>3</td>
</tr>
<tr>
<td>ED 230</td>
<td>Human Development</td>
<td>3</td>
</tr>
<tr>
<td>ED 261</td>
<td>Foundations of Education</td>
<td>3</td>
</tr>
<tr>
<td>ED 263</td>
<td>Educational Psychology</td>
<td>3</td>
</tr>
<tr>
<td>ED 300</td>
<td>Group Processes</td>
<td>3</td>
</tr>
<tr>
<td>ED 360</td>
<td>Diagnostic &amp; Prescriptive Teaching</td>
<td>3</td>
</tr>
<tr>
<td>ED 372</td>
<td>Teaching Elementary Social Studies</td>
<td>3</td>
</tr>
<tr>
<td>ED 373</td>
<td>Teaching Elementary Science</td>
<td>3</td>
</tr>
<tr>
<td>ED 374</td>
<td>Teaching Elementary Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>ED 375</td>
<td>Teaching Elementary Reading</td>
<td>3</td>
</tr>
<tr>
<td>ED 371</td>
<td>Language Arts or</td>
<td>3</td>
</tr>
<tr>
<td>ED 400</td>
<td>Literature for Children and Adolescents</td>
<td>3</td>
</tr>
<tr>
<td>ED 408</td>
<td>Teaching Reading in the Content Area</td>
<td>3</td>
</tr>
<tr>
<td>ED 493</td>
<td>Student Teaching</td>
<td>9</td>
</tr>
<tr>
<td>ED 593</td>
<td>Educating Exceptional Child &amp; Youth</td>
<td>3</td>
</tr>
</tbody>
</table>

54 hrs

**Minor**

Cognate Area (Sociology, Psychology, Mathematics, History, English, etc.) 18 hrs. minimum (most are 21-24 hrs.) which must include 12-15 hrs. of 300-or-above level courses.

A student planning to teach in an elementary field must select a cognate area from any academic department that offers an approved program. Approved programs in the College of Liberal Arts are art, English, communications, history, French, German, Russian, Spanish, music, political science, psychology and sociology. Approved programs in the College of Science are biology, chemistry, mathematics and physics. Economics is an approved program in the College of Administrative Science. Other cognate fields may be approved by petitioning for special consideration.

**MIDDLE/JUNIOR HIGH SCHOOL EDUCATION**

The curriculum in middle/junior high school education is planned to provide a broad liberal base, professional studies in middle school education, and an in-depth study of two disciplines or of selected comprehensive fields (social science, language arts or general science) to prepare teachers for serving in traditional junior high schools or the emerging middle schools. Students may, at their option, add certification in an adjacent field, i.e., high school education, with additional coursework and internships. This program is designed to prepare teachers especially trained in dealing with youngsters undergoing the developmental changes of late childhood, puberty, and early adolescence. The emphasis will be on preparing academic generalists rather than specialists in subject fields.
Students should seek counseling as early as possible. Advisors will be assigned in both professional education and in the teaching fields. The student will earn a B.A. or B.S. depending on the chosen field(s). Upon successful completion of the program the student will be recommended for the Alabama Class B Middle/Junior High School Certificate and will be qualified to teach in grades 4-8.

Course Requirements for a Middle/Junior High School major:

General Education Requirements (See B.A./B.S. pages 69-70)

Major

Program of Study
Middle/Junior High School Education

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED 230 Human Development</td>
<td>3</td>
</tr>
<tr>
<td>ED 261 Foundations of Education in the U.S.</td>
<td>3</td>
</tr>
<tr>
<td>ED 263 Educational Psychology</td>
<td>3</td>
</tr>
<tr>
<td>ED 300 Group Processes or ED 360 Diagnostic &amp; Prescriptive Teaching</td>
<td>3</td>
</tr>
<tr>
<td>ED 375 Teaching of Reading, or ED 400 Literature for Children &amp; Adolescents</td>
<td>3</td>
</tr>
<tr>
<td>ED 388 Teaching Middle and High School Subjects</td>
<td>3</td>
</tr>
<tr>
<td>ED 408 Reading in the Content Areas</td>
<td>3</td>
</tr>
<tr>
<td>ED 490 Senior Seminar in Education</td>
<td>3</td>
</tr>
<tr>
<td>ED 495 Middle School Internship</td>
<td>9</td>
</tr>
<tr>
<td>ED 510 Foundations of Educational Evaluation</td>
<td>3</td>
</tr>
<tr>
<td>ED 593 Education of Exceptional Children and Youth</td>
<td>3</td>
</tr>
</tbody>
</table>

In addition to the above the student is required to have two teaching fields or one comprehensive teaching field. The one exception to this rule is mathematics which can stand alone. Approved single teaching fields are French, German, Russian, Spanish, English, mathematics, biology, chemistry, physics, economics, history, political science, psychology and sociology. Approved comprehensive teaching fields are language arts, general science, and social science. The total number of semester hours in a student’s program will vary from a low of some 130 hours to a high of about 145 hours, depending on the teaching field. The student should seek advisement from the Education Department on this matter. The specific program of studies in the teaching field(s) will be developed with advisors from the chosen field.

Students seeking middle school certification are encouraged to consider selecting the comprehensive programs as they are felt to be the better preparation for teaching at that level.

HIGH SCHOOL EDUCATION

The curriculum in high school education is planned to provide a broad liberal base, professional studies in high school teaching, and an in-depth study of two disciplines or of selected comprehensive fields (social science, language arts, general science) for the purpose of preparing teachers for service in senior high schools. Students may, at their option, also seek certification in middle/junior high school education, with additional coursework and internships. Preparation will be rigorous and will equip the teacher to work in the high school setting and to deal with adolescents.

Students should seek counseling as early as possible. Advisors will be assigned in both professional education and in the teaching field(s). The student will earn a B.A. or B.S. depending on the field chosen. Upon successful completion of the program the student will be recommended for the Alabama Class B High School Certificate, and will be qualified to teach in grades 7-12.
Course Requirements for a Secondary Education major:
General Education Requirements (See B.A./B.S. pages 69-70)

Program of Study — Secondary Education
ED 230 Human Development .................................................. 3
ED 261 Foundations of Education in the U.S. ........................................ 3
ED 263 Educational Psychology .................................................. 3
ED 388 Teaching Middle and High School Subjects ......................... 3
ED 408 Teaching Reading in the Content Area .............................. 3
ED 490 Senior Seminar in Education ............................................ 3
ED 497 High School Internship .................................................. 9
ED 510 Foundations of Educational Evaluation ............................ 3
ED 593 Education of Exceptional Children & Youth ...................... 3

In addition to the above, the student is required to have two teaching fields or one comprehensive teaching field. The one exception to this rule is mathematics which can stand alone.

Approved single teaching fields are French, German, Russian, Spanish, English, mathematics, biology, chemistry, physics, economics, history, political science, psychology and sociology.

Approved comprehensive teaching fields are language arts, general science, and social science.

The number of hours required varies from one teaching field to another. The student should seek advisement from the Education Department on this matter. The specific program of studies in the teaching field(s) will be developed with advisors from the chosen fields.

N-12 EDUCATION

Programs are available in art and in music leading to Alabama Class B Certification for grades N-12. There is one program available in art education and two programs in music education (Instrumental, and Vocal/Choral). These programs are also devoted to providing a broad liberal base of studies. Preparation in the arts has traditionally been rigorous and extensive and these programs are no exception. Students should expect to take more than the minimum of 132 hours required for graduation. Early counseling with advisors is strongly recommended.

Course Requirements for an Art Education Major

Area of Concentration — Art Education
ARS 215 Art for the Elem. Teacher .............................................. 3
ED 230 Human Development .................................................... 3
ED 261 Foundations of Education in U.S. ..................................... 3
ED 263 Educational Psychology ................................................ 3
ED 388 Teaching Middle & High School Subjects ......................... 3
ED 408 Teaching Reading in the Content Areas .............................. 3
ED 490 Senior Seminar in Education ......................................... 3
ED 499 Internship ................................................................. 9
ED 510 Foundations of Educational Evaluation ............................ 3
ED 593 Education of Exceptional Children & Youth ...................... 3
Art:

The major in art education is made up of some 51 semester hours of work, part of which may be included in the general studies component. This program should be planned with the Art Department providing advice and approval.

Course Requirements for a Music Education Major

General Education Requirements (See B.A. page 69)

Major

Area of Concentration — MUSIC EDUCATION: Instrumental or Vocal/Choral

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED 230 Human Development</td>
<td>3</td>
</tr>
<tr>
<td>ED 261 Foundations of Education in U.S.</td>
<td>3</td>
</tr>
<tr>
<td>ED 263 Educational Psychology</td>
<td>3</td>
</tr>
<tr>
<td>ED 388 Teaching Middle &amp; High School Subjects</td>
<td>3</td>
</tr>
<tr>
<td>ED 408 Teaching Reading in the Content Areas</td>
<td>3</td>
</tr>
<tr>
<td>ED 490 Senior Seminar in Education</td>
<td>3</td>
</tr>
<tr>
<td>ED 499 Internship</td>
<td>9</td>
</tr>
<tr>
<td>ED 510 Foundations of Educational Evaluation</td>
<td>3</td>
</tr>
<tr>
<td>ED 593 Education of Exceptional Children &amp; Youth</td>
<td>3</td>
</tr>
<tr>
<td>MUE 225 Introduction to Music Education</td>
<td>1</td>
</tr>
<tr>
<td>MUE 326 Teaching General Music in Elementary Schools</td>
<td>3</td>
</tr>
<tr>
<td>MUE 327 Teaching General Music in Secondary Schools</td>
<td>3</td>
</tr>
<tr>
<td>MUE 428 Organizing and Directing Vocal Groups in Secondary Schools</td>
<td>2</td>
</tr>
<tr>
<td>MUE 429 Organizing and Directing Instrumental Groups in Secondary Schools</td>
<td>2</td>
</tr>
</tbody>
</table>

Music: Instrumental or Vocal/Choral

The majors in music education (both instrumental and vocal/choral) are made up of some 48-51 semester hours of coursework, part of which may be counted as general studies. These programs of study should be planned with the Music Department providing advice and approval.

Other Considerations

Students seeking certification in elementary, middle, high school, or N-12 education programs will have opportunity for electives by judicious planning of their general studies courses and within their major(s).

Students may substitute appropriate courses taken at another institution with permission of the Education Department if equivalency is established.

It should be noted that the requirements for the bachelor’s degree will exceed 132 hours in most areas.

Multiple Certification

Under the new State of Alabama plan, there are five levels of certification of teachers, namely: N-3, 1-6, 4-8, 7-12, and N-12. UAH offers all options except the N-3 option. For a person certified for grades 1-6 under the new standards, adding middle school endorsement would also permit teaching in grades 7 and 8 in the teaching field(s) for which the person has completed the requirements as otherwise outlined in this Catalog. For a person with high school certification, adding middle school endorsement would also permit teaching in grades 4-6 in the teaching field(s) for which the person has completed the requirements.
Changing from One Field to Another

Elementary education students who wish to extend their preparation to include endorsement in grades 7 and 8 may obtain a middle school endorsement by completing an approved program consisting of the following:

1. a course in the understanding of the purposes and design of the middle school, including its curriculum;
2. a course in the appreciation for and an understanding of the unique nature of the developing human organism during the preadolescent and early adolescent years;
3. an appropriate teaching field of at least 27 semester hours selected from those approved at UAH.
4. an additional internship of 100+ clock hours.

High School education students who wish to extend their preparation to include endorsement in grades 4-6 may obtain a middle school endorsement by completing an approved program consisting of the following:

1. a methods course in using instructional strategies, media, and materials, appropriate for effective teaching of preadolescents;
2. a course in the understanding of the purposes and design of the middle school as an institution, including its curriculum;
3. a course in the appreciation for and an understanding of the unique nature of the developing human organism during the preadolescent and early adolescent years;
4. a course designed for developing the knowledge and skills necessary to guide the continued growth and development of reading skills appropriate for the middle school child;
5. an appropriate teaching field major of at least 27 semester hours.
6. an additional internship of 100+ clock hours.

Education (ED)

111 Career Exploration 1 hr.
Educational and vocational planning. Prerequisites: 9 hours college credit and placement tests.

115 Effective Reading and Study Skills 3 hrs.
Basic reading-skill development in class activities to raise skills on literal, interpretive, critical, and creative levels of comprehension.

230 Human Development 3 hrs.
Overview of human development stressing continuity from conception to adulthood. Practical applications for teachers and parents.

261 Foundations of Education in the United States 3 hrs.
Survey of social, cultural, historical, and philosophical foundations of education; interrelationships of society and education, effects of social change and influences of social-cultural values upon education; educational ideas and processes as they attempt to shape curricula. The perennial search for the meaning of education, perceived not merely as schooling, but as a process of enculturation and socialization.

263 Educational Psychology 3 hrs.
Psychological principles basic to an understanding of the learner, the learning process, and the learning situation. Prerequisites: sophomore standing.

325 The Sociology of Education 3 hrs.
Sociological approach to the study of education as a social institution; its structure,
function and role in contemporary life. Prerequisite: SOC 100 or approval of instructor. (Same as SOC 325).

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>411</td>
<td>Guidance for Teachers</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>456</td>
<td>Mental Health in the School</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>467</td>
<td>Tests and Measurements</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>500</td>
<td>Special Problems in Education</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>502</td>
<td>Environmental Education</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>510</td>
<td>Foundations of Education Evaluation</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>549</td>
<td>Audiovisual Instruction</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>593</td>
<td>Education of Exceptional Children and Youth</td>
<td>3 hrs.</td>
</tr>
</tbody>
</table>

Elementary Education

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>215</td>
<td>Physical Education for the Elementary Teacher</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>231</td>
<td>Teaching the Young Child</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>300</td>
<td>Group Processes</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>360</td>
<td>Diagnostic and Prescriptive Teaching</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>371</td>
<td>Teaching Elementary Language Arts</td>
<td>3 hrs.</td>
</tr>
</tbody>
</table>
372 Teaching Elementary Social Studies 3 hrs.
Curriculum instructional approach, and materials for teaching social studies in grades 1-6. Helping beginning teachers acquire background skills in organizing and teaching units of work. Prerequisite: Admission to the teacher education program.

373 Teaching Elementary Science and Health 3 hrs.
Review of the major concepts taught in the elementary classroom in natural and health science. Opportunity to refine teaching skills in the planning, implementation, and evaluation of science lessons and units of instruction. Prerequisite: admission to the Teacher Education Program.

374 Teaching Elementary Mathematics 3 hrs.
Overview of the mathematics concepts and skills taught in grades K-6 with an emphasis on the principles, methods, and materials used in the teaching and evaluation of elementary school mathematics. Focuses on the attitudes and behaviors of students and teachers in the actual planning and implementation of math instruction for an elementary school classroom. Prerequisite: admission to the Teacher Education Program.

375 Teaching Elementary Reading 3 hrs.
An introduction to the basic principles of reading instruction in the elementary grades including theoretical bases for instruction, methods of instruction, materials, and assessment of individual needs. Prerequisite: admission to the Teacher Education Program.

400 Literature for Children and Adolescents 3 hrs.
Relationship between developmental stages and literature that young people find relevant at various stages of growth. Understanding and appreciation of interdependence of experience and literature. Knowledge of the literature and critical assessment including use of library resources in teaching reading.

492 Observation and Participation in Teaching 3-6 hrs.
Selected observation and participation in elementary schools. For students in curricula designed for both elementary and secondary schools and for experienced teachers. Prerequisites: ED 230, 261, 263, 300, 360, three methods courses or equivalent approved courses, and an approved application for student teaching.

493 Elementary School Internship 9 hrs.
The course will focus on an apprenticeship training in a natural teaching-learning environment. During the assignment the role of the student teacher will vary from that of being an interested observer to that of being responsible for the day-to-day teaching and learning activities within an assigned classroom. The student teacher is expected to assimilate university training and on-the-site activities in order to synthesize methods and strategies for future professional use. A minimum of 75 clock hours of actual teaching is required. Prerequisite General Education Requirements: ED 230, 261, 263, 300, 360 and three methods courses, or equivalent.

494 Elementary School Internship 3 hrs.
This course is essentially the same as ED 495. However, it will require a minimum of only 100 clock hours, including a minimum of some 25 hours of responsible teaching. It is to be used by persons seeking dual certification or by post-graduate students seeking additional areas of endorsement. Prerequisite: permission of the department chairman.
Middle and High School Education

388  Teaching Middle and High School Subjects  3 hrs.
(Major area of teaching to be designated.) Materials and methods in the major fields. Prerequisites: ED 263 and admission to Teacher Education Program.

408  Teaching Reading in the Content Area  3 hrs.
Provides knowledge of certain basic developmental and remedial reading skills, practices, and concepts. Extends those learned in previous, more fundamental, reading courses and shows how to apply fundamental skill and knowledge to the regular middle school/high school classroom. This will include adapting fundamentals of reading instruction to the various subject-matter areas (i.e., the sciences, social studies, English, etc.). Survey of special reading programs such as remedial reading and reading instruction as practiced in special education. Prerequisite: junior standing.

490  Senior Seminar in Education  3 hrs.
Course to be taken concurrently with student teaching. Prerequisites: ED 388 and senior standing.

495  Middle School Internship  9 hrs.
The course will focus on apprenticeship training in a natural teaching-learning environment. During the assignment the role of the student teacher/intern will vary from that of being an interested observer to that of being responsible for the day-to-day teaching and learning activities within an assigned classroom. The student teacher/intern is expected to assimilate university training and on-site activities in order to synthesize methods and strategies for future professional use. A minimum of 75 clock hours of actual teaching and some 300 hours overall is required. Prerequisites: all required professional educational courses should be complete before admission to the program.

496  Middle School Internship  3 hrs.
This course is essentially the same as ED 495. However, it will require a minimum of only 100 clock hours, including a minimum of 25 hours of responsible teaching. It is to be used by persons seeking dual certification or by post-graduate students seeking additional areas of endorsement. Prerequisite: permission of the Department Chair.

497  High School Internship  9 hrs.
Observation and student teaching in secondary schools. Prerequisites: ED 263, 388, 408, 510 and approved application for student teaching.

498  High School Internship  3 hrs.
This course is essentially the same as ED 497. However, it will require a minimum of only 100 clock hours, including a minimum of some 25 hours of responsible teaching. It is to be used by persons seeking dual certification or by post-graduate students seeking additional areas of endorsement. Prerequisite: permission of the Department Chair.

Other Internships

499 N-12 Internship (Art, Music)
Supervised teaching experience in local schools. A minimum of 75 clock hours of actual teaching and some 300 hours overall is required. Concurrent conferences arranged as needed. Prerequisite: an approved application for student teaching.
Graduate Study in Education

Master's degrees are available in several academic areas all leading to State of Alabama certification at the Class A level.

The Department of Education offers programs in Secondary Education (with Master's degrees and Alabama Class A certification in English, History, Biology, Chemistry, Mathematics, and Physics). Certain individual courses are also offered, on demand, for in-service training of personnel. The programs in Secondary Education are offered in conjunction with the other departments. A complete listing of courses will be found in the catalog sections describing graduate offerings from those departments.

The graduate education program requires a broad and liberal education base, in-depth study of one or more disciplines, and professional study of the teaching arts. The department's purpose is the preparation of qualified and competent elementary, middle, and high school faculty, the training of personnel in allied fields, and the continuous professional development of all educational personnel through graduate and academic field service programs. It provides educational systems and other institutions within the region with assistance in program, staff, and curriculum development. Likewise, it recognizes a research mission to expand the body of knowledge which has as its core the teaching-learning process.

Another prime function of the department is to recommend to the State Department of Education certification in conjunction with the graduate degrees offered (where appropriate).

While it is not a requirement for UAH graduation, the State Department of Education requires that a student hold or be eligible to hold a Class B certificate as a prerequisite for issuance of the Class A certificate. Similarly, the State also requires proof of one year of teaching experience before the Class A certificate will be issued. Note that the non-traditional fifth-year program has somewhat different requirements.

Special Facilities

The Department maintains a Teacher Materials Center where current teaching materials are available and where laboratory classes are held. Some in-field training is handled in cooperation with the local school systems.

Degree Programs:

(1) Secondary Education (Middle and High School options, traditional and strengthened subject matter available)

(a) Middle School (traditional)

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED 604, ED 606, ED 626 (required)</td>
<td>9</td>
</tr>
<tr>
<td>ED 510 or 610</td>
<td>3</td>
</tr>
<tr>
<td>ED 601 or ED 603 or ED 608 (select one)</td>
<td>3</td>
</tr>
<tr>
<td>Teaching Field</td>
<td>24</td>
</tr>
<tr>
<td>Special Education Requirement*</td>
<td>(3)</td>
</tr>
</tbody>
</table>

(b) High School (traditional)

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED 604, ED 606, ED 630 (required)</td>
<td>9</td>
</tr>
<tr>
<td>ED 510 or 610</td>
<td>3</td>
</tr>
<tr>
<td>ED 601 or ED 603 or ED 608 (select one)</td>
<td>3</td>
</tr>
<tr>
<td>Teaching Field</td>
<td>24</td>
</tr>
<tr>
<td>Special Education Requirement*</td>
<td>(3)</td>
</tr>
</tbody>
</table>
(c) Middle School (Strengthened Subject Matter)
   ED 604, ED 610, ED 626 (required) ................................................... 9 sem. hrs.
   Teaching Field ................................................................. 24 sem. hrs.
   Special Education Requirement* ...................................... (3 sem. hrs.)

(d) High School (Strengthened Subject Matter)
   ED 604, ED 610, ED 630 (required) ................................................... 9 sem. hrs.
   Teaching Field ................................................................. 24 sem. hrs.
   Special Education Requirement* ...................................... (3 sem. hrs.)

*Special Education Requirement: A survey course in special education (ED 593) is required if no such course has been taken at undergraduate or graduate levels prior to entering program.

(2) Non-Traditional Fifth-Year Programs (Available in: English, History, Biology, Chemistry, Mathematics, and Physics.)
   ED 510, or 610, ED 593, ED 604, ED 608,
   ED 630 (Req.) ................................................................. 15 sem. hrs.
   ED 698 (Req.) ................................................................. 6 sem. hrs.
   Teaching Field ................................................................. 24 sem. hrs.

This is a program leading to Class A certification in the teaching fields listed. The prerequisite of Class B certification is waived.

Students may proceed directly from a degree in the subject field(s) to this program.

Prerequisites:
(a) A bachelor's (or higher) degree from an accredited institution.
(b) A major, or the equivalent, at the undergraduate level in the field where certification is sought.
(c) Sixty semester hours in general studies at the undergraduate level, with some work in each of four areas: humanities, social studies, science, and mathematics.
(d) Admissibility to the graduate school, and to subject field programs.
(e) An accumulation of no more than 12 semester hours of coursework, on any level, in professional education, and in the subject field.
(f) A passing score on the Alabama State English Language Proficiency Exam.
(g) Acceptable scores on the Graduate Record Exam or the Miller Analogies Test.
(h) Submission of proper application forms with documentation of items a - f above to the Registrar's office. Note: student may be conditionally admitted and may take up to 12 semester hours while meeting the stated prerequisites.

GRADUATE COURSES IN EDUCATION

500 Special Problems in Education 3 hrs.
   Independent study, special projects, and special in-service programs. Prerequisite: senior standing.

502 Environmental Education 3 hrs.
   The general nature of ecological life systems, relationships of humankind and environment, major conservation problems facing the world today, exploration of alternate solutions and the tasks for educators.
510 Foundations of Education Evaluation 3 hrs.
Measurement process with emphasis on its relationship to problems of educational evaluation. Evaluation as an integral part of overall educational planning in addition to its use in measurement and evaluation of academic achievement.

522 Space Orientation for Teachers: Elementary 3 hrs.
This course introduces the teacher to a variety of space-related subjects and techniques which may be used in the classroom. The curriculum is designed to reflect current research and technological development in a hands-on experience with the space program. It will include a number of experiments which can be duplicated in the classroom. It is offered in cooperation with the Alabama Space and Rocket Center.

532 Space Orientation for Teachers: Secondary 3 hrs.
This course introduces the teacher to a variety of space-related subjects and techniques which may be used in the classroom. The curriculum is designed to reflect current research and technological development in a hands-on experience with the space program. It will include a number of experiments which can be duplicated in the classroom. It is offered in cooperation with the Alabama Space and Rocket Center.

549 Audiovisual Instruction 3 hrs.
Audiovisual media in teaching and the selection, use, and maintenance of audiovisual materials in educational programs.

593 Education of Exceptional Children and Youth 3 hrs.
Introduction to the field of exceptional children and youth, including observations. This course, or equivalent, is a prerequisite to certification.

600 Special Problems in Education 1-3 hrs.
Independent study, special projects, and in-service programs.

601 Public School Organization and Administration 3 hrs.
Systematic treatment of problems of local, state and national administration. New developments modifying educational administration, state authorization and organization, board of education, superintendent of schools, personnel and management, financial support, and public relations.

602 The Principal as Educational Leader 3 hrs.
Role of principal as supervisor, organizer, and administrator of schools, programs of study, teaching staff, pupil personnel, plant and equipment, and community relationships.

603 Sources of American Educational Thought 3 hrs.
Foundations of education in their philosophical, historical, social, and comparative aspects. Major relationships of schools and educative processes with society at large pointing to development of particular crucial issues.

604 Contributions of Psychology to Education 3 hrs.
Principles, theory, and practice of psychology for teaching and administrative service in educational institutions. Factors that determine learning and conditions of effective teaching. Administrator and supervisor as organizer of the milieu wherein teaching, learning, and growth occur.

606 Principles of Curriculum Development 3 hrs.
Principles of curriculum construction that underlie the reorganization of the programs of study for elementary and secondary schools. Origin and background of the curriculum, methods of organization, curriculum planning and development, and pertinent applications.

607 The Educational Leader as Evaluator 3 hrs.
Procedures and techniques of empirical evaluation including a sampling of available instruments; and research approaches complementary to the course AS 627 (Quantitative Methods of Management). Evaluation of teacher and staff performance.
Curricula, achievement and ability, media, and equipment, and plant and facilities. Preparation for maintenance of accountability.

608 Reading in the Content Areas 3 hrs.
Instruction in developing reading skills, methods and materials. Motivations of children and adolescents, functional reading and the atypical learner. Diagnosis and remediation of related deficiencies. Other related topics for regular and special education teacher.

610 Foundations of Educational Evaluation 3 hrs.
Measurement process with emphasis on its relationship to problems of educational evaluation. Evaluation as an integral part of overall educational planning in addition to its use in measurement and evaluation of academic achievement. Prerequisite: ED 604

611 Principles of Guidance 3 hrs.
Sociological, psychological, and educational foundations of guidance; history and growth of the guidance movement; functions, scope, organization, and administration of guidance.

622 Space Orientation for Teachers: Elementary 3 hrs.
The curriculum for this program will build on that already attained by those educators who have participated in the generic program conducted at UAH, by providing experiences available in Washington, D.C. These will occur at the National Air and Space Museum, Goddard Space Flight Center, Owens Science Center (Challenger Center), Maryland Science Center, U.S. Naval Observatory, Space Telescope Science Institute at John Hopkins, National Oceanic and Atmospheric Administration, and the Office of Technology Assessment. Prerequisites: ED 532, ES 532, SS 532, or ED 522. (Equivalent to EEC 592 at UAB).

626 Modern Middle School Programs 3 hrs.
Survey of important viewpoints and issues, reorganization trends, typical research findings by subject fields and analysis of current curriculum proposals at the national, state, and local levels.

630 Modern Secondary School Programs 3 hrs.
Important viewpoints and issues, reorganization trends, typical research findings by subject fields. Analysis of current curriculum proposals at the national, state, and local levels.

632 Space Orientation for Teachers: Secondary 3 hrs.
The curriculum for this program will build on that already attained by those educators who have participated in the generic program conducted at UAH, by providing experiences available in Washington, D.C. These will occur at the National Air and Space Museum, Goddard Space Flight Center, Owens Science Center (Challenger Center), Maryland Science Center, U.S. Naval Observatory, Space Telescope Science Institute at John Hopkins, National Oceanic and Atmospheric Administration, and the Office of Technology Assessment. Prerequisites: ED 532, ES 532, SS 532, or ED 522.

641 Staff Development 3 hrs.
A study of the principles and techniques for the continued professional development of individuals and groups who are responsible for establishing learning environments. The course is designed for those in instructional leadership positions who are responsible for the development (in-service) programs including conferences, workshops, single sessions, and comprehensive programs.
International Aerospace Education: Soviet Union 3 hrs.
On-site seminar on the Soviet Space Program. Lectures deal with rocket and shuttle design, cosmonautics, Soviet Science Education and Space Policy decision-making. Locations include Space Mission Control, Star City, the Baikanur Cosmodrome, and various schools, institutes, ministries, and factories involved in aerospace education and industry in Moscow, Kiev, Lenengrad, and Krasnoyarsk.

Field Experience Practicum 1 hr. each
Student demonstration of performance competencies in school administration through field practicum. Students with committee approval may register for 647-648-649 individually or jointly. Course approval based upon committee’s evaluation of student’s readiness for field practicum. Courses individually scheduled to fit concurrently with student’s regular employment assignment.

Major Issues and Trends in Instructional Leadership 3 hrs.
This course is designed to: stimulate student participation in the analytic process of examining issues and trends in the broad field of instructional leadership; serve as a vehicle for increasing proficiency in writing skills; refine participants’ abilities to analyze, synthesize, and formulate a position relative to controversial educational issues and areas.

Instructional Leadership 3 hrs.
Upon completion of this course each student describes himself/herself in terms of leadership strengths, modality strength, cognitive strength, personality type, coping procedures, time management, and other pertinent leadership variables. The course is designed to promote peer interaction and introspection such that each student receives feedback which enables him/her to analyze the conflict between self perception and peer perception.

High School Internship 6 hrs.
An internship in the student’s teaching field in a secondary school setting. During the assignment, the role of the student teacher/intern will vary from that of observer to an active participant to full responsibility for teaching. A minimum of 125 hours of actual teaching and 300 hours of overall experience is required. Prerequisite: All required professional education courses and the majority of the teaching field courses should be completed before admission to the internship.

English Department
Professors Martin, Wilson; Professors Emeriti, Francis, Hutchens, Welker, Woodard; Associate Professors Moore, Mebane (Chair), Munson, Neff; Associate Professor Emerita Harrison; Assistant Professors Dillard, Mangum, Norman, Schenker, Szilagyi; Instructor Allen; Lecturers Bradburn, Lavan, Singer, Singh, Chasteen.

The Department of English offers courses leading to a minor, a B.A. and an M.A. in English. The department also offers a Cognate Studies option in Technical Writing as well as courses in Linguistics and English Language Studies leading to certificate a in Teaching English to Speakers of Other Languages (T.E.S.O.L.).

English Major

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sophomore Survey (as described in GER)</td>
<td>6</td>
</tr>
<tr>
<td>Shakespeare (EH 360)</td>
<td>3</td>
</tr>
<tr>
<td>American literature (EH 330, 331, 339, 430, 431, 530, 532, 533)</td>
<td>3</td>
</tr>
<tr>
<td>Literature before 1800 (EH 380, 381, 450, 460, 470, 472, 474, 492, 551, 571)</td>
<td>6</td>
</tr>
<tr>
<td>Literature after 1800 (EH 330, 331, 390, 391, 418, 420, 421, 430, 431, 493, 500, 532, 533, 594)</td>
<td>6</td>
</tr>
<tr>
<td>Electives</td>
<td>12</td>
</tr>
</tbody>
</table>

207
One course in the novel is required; additional novel courses must be counted as English electives. Six semester hours must be taken in courses numbered 400 or above. Transfer students majoring in English must take at least 12 semester hours of upper division English courses (numbered 300 or above) at UAH. No more than 3 semester hours' credit in creative writing may be applied to an English major or minor without special approval. Any English course deemed appropriate by the advisor may be incorporated into the program of study. Programs of study for teacher certification are available from faculty advisers.

The English major as defined above will form a part of a program that must include one of the following variations: (1) A minor drawn from one discipline that includes a minimum of 21 semester hours, 6 hours of which must be numbered 300 or above, (2) a major from another discipline, (3) an area of cognate studies drawn from two or more disciplines that includes a minimum of 21 semester hours, of which 9 hours must be in courses numbered 300 or above.

At the beginning of the sophomore year, the English major should request an advisor for help in planning a program of study as early as possible.

**English Minor**

A minor in English should include a minimum of 21 semester hours of which at least 3 hours must be taken in courses numbered 400 or above, identified as:

<table>
<thead>
<tr>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic courses (GER in composition and literature)</td>
</tr>
<tr>
<td>Shakespeare (EH 360)</td>
</tr>
<tr>
<td>Course numbered 400 or above</td>
</tr>
<tr>
<td>Electives in English</td>
</tr>
</tbody>
</table>

A student with a minor in English must take at least 6 semester hours of advanced English courses (numbered 300 or above) at UAH.

**Cognate Studies in Technical Writing**

Preparation for a career in the field of technical writing should combine intensive training in writing with practical experience and fundamental technical skills. The 21-hour cognate studies curriculum brings together all three. All students must take EH 301 (Technical Writing), EH 302 (Technical Editing), and EH 320 (Practicum in Writing) in sequence. Students from any major may enroll. Those with non-technical majors should plan early to take courses in technical or scientific fields. Students with technical majors should consult the Coordinator of Business and Technical Writing for current requirements.

A typical program for a non-technical major is:

<table>
<thead>
<tr>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical Writing (EH 301)</td>
</tr>
<tr>
<td>Technical Editing (EH 302)</td>
</tr>
<tr>
<td>Language Course (EH 307 or 508)</td>
</tr>
<tr>
<td>Practicum in Writing (EH 320)</td>
</tr>
<tr>
<td>Technical Courses (in Science, Math, Computer Science or other discipline as directed)</td>
</tr>
</tbody>
</table>

**English for Second Area of Study**

Students majoring in elementary or secondary education may select English as their second area of study. This area consists of a minimum of fifteen hours beyond the freshman composition requirement (EH 101 and 102) and the sophomore literature requirement (EH 205 and
These hours must be in courses numbered 300 or above and must be selected from the courses listed below with the approval of a faculty advisor in the Education Department and the chair of the English Department.

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>American literature (EH 330, 331, 339, 430, 431, 530, 532, 533)</td>
<td>3</td>
</tr>
<tr>
<td>Shakespeare (EH 360)</td>
<td>3</td>
</tr>
<tr>
<td>Structure of Modern English (EH 307)</td>
<td>3</td>
</tr>
<tr>
<td>Literature before 1800 (EH 380, 381, 450, 460, 470, 472, 474, 492, 551, 571)</td>
<td>3</td>
</tr>
<tr>
<td>Literature after 1800 (EH 330, 331, 390, 391, 418, 420, 421, 430, 493, 500, 532, 533, 594)</td>
<td>3</td>
</tr>
</tbody>
</table>

One 3-hour course in creative writing (EH 310) may be substituted for any course in the pre-1800 or after-1800 categories.

English (EH)

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Name</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>003</td>
<td>Basic English</td>
<td>No credit</td>
</tr>
<tr>
<td>101</td>
<td>Freshman Composition</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>102</td>
<td>Freshman Composition</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>105</td>
<td>Honors English Seminar</td>
<td></td>
</tr>
</tbody>
</table>

Courses below are open to students who have completed 6 hours of freshman composition, with exceptions as indicated.

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Name</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>205</td>
<td>Survey of English Literature</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>206</td>
<td>Survey of English Literature</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>210</td>
<td>Fiction Writing</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>230</td>
<td>Survey of American Literature</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>240</td>
<td>World Literature</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>241</td>
<td>World Literature</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>242</td>
<td>Mythology</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>250</td>
<td>Honors World Literature Seminar I</td>
<td>3 hrs.</td>
</tr>
</tbody>
</table>
251 Honors World Literature Seminar II: 3 hrs.
Major texts from 1700 to the present. Prerequisite: EH 105 or admission to Honors Program.

300 Strategies for Business Writing 3 hrs.
Practical business writing with emphasis on rhetoric, organization, and research. Prerequisites: 6 hours of freshman composition; CM 113, BIB 230, junior standing; open to all students in the School of Administrative Science or by permission of the Department of English. Does not count toward English minor. Lab fee: Level 4.

301 Technical Writing 3 hrs.
Practical writing, especially technical or scientific reports and proposals, with emphasis on organization, research, and presentation. Prerequisites: EH 101 and junior standing; EH 102 recommended. Does not count toward English minor except for Cognate Studies in Technical Writing. Lab fee: Level 4.

302 Technical Editing 3 hrs.
Clarifying, expanding, reducing, and rewriting technical reports and other documents created by others. Emphasis on elements of style and usage, revision, proofreading, and application of rhetorical techniques to the work of engineers, scientists, and technicians. Prerequisites: EH 300 or EH 301. Does not count toward English minor except for cognate studies in technical writing. Lab fee: Level 4.

307 Structure of Modern English 3 hrs.
Analysis and description of major aspects of the phonological, morphological, and syntactic components of Modern English. An eclectic grammatical approach which includes traditional, structural, and transformation grammar. Emphasis is on analysis and practical application of grammar. Prerequisite: successful completion of basic English requirements or approval of the instructor.

310 Advanced Fiction Writing 3 hrs.
Workshop in advanced fiction writing. Prerequisite: Approval of instructor.

320 Practicum in Writing 1-3 hrs.
Writing and editing under the supervision of professionals. May be repeated up to three separate terms for no more than 3 hours total credit. Prerequisites: EH 301, EH 302, enrollment for Cognate Studies in Technical Writing, permission of the Coordinator of Business and Technical Writing, and a successful interview with the participating technical supervisor. Enrollment requires advance planning. Does not count toward English minor except for Cognate Studies in Technical Writing.

Courses below are open to students who have completed the general education requirement in literature, with exceptions as indicated.

330 Major American Writers 3 hrs.
Major writers from the Colonial period to Whitman and Melville.

331 Major American Writers 3 hrs.
Dickinson to Eliot and Faulkner.

339 Special Studies in American Literature and Culture 3 hrs.
Topics announced in advance.

340 Special Topics in Literature 3 hrs.
Theme, writer, or historical movement to be announced in advance.

345 Special Topics in Film, Literature, and Film Theory 3 hrs.
Offered periodically on varying topics.

360 Shakespeare 3 hrs.
Renaissance background and at least six plays, including history, comedy, and major tragedies.
380 Restoration and Early Eighteenth Century
Dryden, Swift, Pope, and others. 3 hrs.

381 Later Eighteenth Century
Johnson, Boswell, and others. 3 hrs.

390 The Romantic Period
Poetry and nonfictional prose, 1780-1832. 3 hrs.

391 The Victorian Period
Poetry and nonfictional prose, 1832-1901. 3 hrs.

418 Representative Texts by Women Writers
Focus on women’s contribution to the literary tradition. 3 hrs.

420 Modern Poetry
American and British poetry from the 1890’s to the present—Yeats, Pound, Eliot, Frost, Stevens, and others. Poets will be studied against the background of the social, political, and technological revolutions that characterize the present century. 3 hrs.

421 Modern Drama
New movements in drama from Ibsen to the present. 3 hrs.

430 The American Novel
Theme and form of the American novel from Cooper to James. 3 hrs.

431 The American Novel
Representative works from the school of naturalism to the present. 3 hrs.

450 Chaucer
The Canterbury Tales and other major works. 3 hrs.

460 Sixteenth-Century Poetry and Prose
More, Wyatt, Sidney, Spenser, and others. 3 hrs.

470 Milton
Milton’s minor poems, selected prose, and Paradise Lost. Recommended prerequisite: one upper level English course. 3 hrs.

472 Seventeenth-Century Poetry
Seventeenth-century poetry, excluding Milton. Recommended prerequisite: junior standing. 3 hrs.

474 Seventeenth-Century Prose 1600-1660
Major prose writers of the period, with emphasis on the transitional nature of their ideas and styles, and on rhetorical background and genres. Recommended prerequisite: one upper level English course. 3 hrs.

492 The English Novel
Defoe to Jane Austen: critical reading of representative novels accompanied by historical study of the emergence of the genre. 3 hrs.

493 The English Novel
Dickens through Hardy: critical reading of representative novels accompanied by historical survey of major trends. 3 hrs.

English as a Second Language (ESL) Courses

The English Department offers courses in English as a Second Language (ESL) for those non-native speakers of English who need to improve their English language skills. ESL 101 and 102 are designed primarily to assist students to improve their oral production, aural comprehension, and vocabulary; ESL 103 and 104 are designed to assist students in improving their reading comprehension and composition skills. Placement tests are given prior to the commencement of quarters; non-native speakers of English are advised to contact the Office of Admissions and Records or the English Department for time and place of testing.
ESL courses are offered at the intermediate/advanced levels; ESL courses at the beginning level are offered through the Division of Continuing Education.

ESL (English as a Second Language)

101 ESL Spoken English I 1 hr.
Course in spoken English emphasizing the sound system (including pronunciation, intonation patterns, basic sentence patterns and their transforms, and vocabulary improvement expansion). Includes general conversational topics and topics directly related to the academic environment. Prerequisite: Minimum of mid-beginning ESL oral-aural English skills.

102 ESL Spoken English II 1 hr.
A course in spoken English for non-native speakers at the mid-intermediate to mid-advanced ESL level. Course emphasizes oral English used in the academic environment and prepares students to participate freely in classroom discussions, on panels, and in interviews. Prerequisite: Minimum of mid-intermediate skills in ESL oral-aural skills.

103 ESL Composition I 1 hr.
A course in basic composition emphasizing those skills necessary to write effective sentences and paragraphs. This course includes basic mechanics, vocabulary expansion, and the concepts of unity and coherence. Students receive an introduction to planning and writing compositions. Prerequisite: Mid-beginning to mid-intermediate ESL composition skills.

104 ESL Composition II 1 hr.
An advanced ESL composition course designed to further the writing skills of non-native speakers. This course provides the student with instruction and practice in writing whole works, essays, research papers. It focuses on both form and content. Prerequisite: Mid-intermediate to advanced ESL composition skills.

Linguistics and English Language Studies

The department offers a variety of courses related to General Linguistics, English Language, Grammar, and the Teaching of English to Speakers of Other Languages (T.E.S.O.L.). Students may select a set of courses which will provide them with a background in Linguistics, English Language, Old English, and Middle English. For those who are interested in the Teaching of English to Speakers of Other Languages (T.E.S.O.L.), the department offers a certificate in T.E.S.O.L. in conjunction with M.A. degree. Interested undergraduates may take courses which would be helpful, should they eventually want to go on for the T.E.S.O.L. certificate and M.A. degree. Such students should consult with the chairperson or the director of the T.E.S.O.L. Program.

Master of Arts

The Master of Arts with a major in English meets the needs of a variety of professional options. The M.A. sharpens the student’s scholarship to the level of professional competence and leads to new levels of appreciation and pleasure in English studies. It qualifies secondary school teachers to earn Class A certification. It also enables graduates to become faculty members in private schools, junior colleges, community colleges, and certain four-year institutions. Additionally, it prepares students to move into programs leading to the Ph.D.
Graduate courses are offered both as seminars and as lecture courses. They are focused both on specific topics (individual authors or genres) and broader subjects, such as the historical periods of literature. Classes are usually small, so that all students are given the benefit of personal counseling.

Degree Requirements

The English graduate faculty offers courses in English and American literature and language. In addition to the Graduate School requirements, the requirements for the M.A. in English are:

1. Eighteen semester hours of graduate work in English, six hours of which may be transferred credit approved by the department Graduate Committee.
2. Six additional semester hours of elective graduate courses in English or a related subject approved by the Graduate Committee.
3. At least half of the hours offered for the degree (exclusive of thesis credit hours) in courses numbered 600 or above and at least nine hours in English courses at UAH numbered 600 or above (exclusive of thesis credit hours).
4. Master's thesis with at least two terms (six hours) of English 699. Upon petition to and approval by the Graduate Committee, a student may substitute nine hours of graduate English courses for the thesis.
5. A minimum of 24 semester hours and a thesis (Plan I), or 33 semester hours (Plan II).
6. A maximum course load of nine semester hours per term is permitted.
7. Oral comprehensive examination on courses taken and on the thesis. For students who choose plan II (non-thesis option), both oral and written examinations are required. The written examination must be passed before the oral examination is taken.
8. A reading knowledge of French, German, Spanish, or another language deemed by the department to be academically appropriate. Adequate reading knowledge must be demonstrated by one of the following options:
   8. a. Four semesters or their equivalent in one language with a minimum average grade of B at an accredited institution, completed not more than five years before the student's first graduate course in the UAH program.
   8. b. Intermediate-level performance on a UAH examination in the language, given each term at an announced test date.
   8. c. A score not lower than the 25th percentile on the Graduate School Foreign Language Test (GSFLT). Registration is necessary 21 days before the examination. A fee is required. Any student who plans to pursue the doctoral degree is urged to take this test and pass with a score in the 50th percentile.

In lieu of the language requirement, additional coursework of three semester hours of English 507 (English Linguistics) or English 508 (History of the English Language) or a designated course of a similar nature is required. This option makes a total of 33 hours required for an M.A. in English and 36 hours required for an M.A. in English with Class A teacher certification or on the regular Plan II.

Class A Teacher Certification

In addition to the requirements for the M.A. in English or in lieu of them (as indicated below), a student seeking Class A teacher certification must meet the following requirements:

1. Hold or earn before receiving the degree a Class B teacher certificate.
2. Take nine hours of graduate courses in Education. These hours replace the thesis requirement; thus, of the 33 semester hours required, 24 are in English and nine are in Education. Under provisions for strengthened subject matter programs, English courses may be taken instead of Education courses if certain requirements have been met at the undergraduate level.

Non-Traditional Fifth-Year Program

Those who have a BA or BS degree with a major or its equivalent in English, who have not taken more than twelve semester hours in teacher education (graduate or undergraduate), and who are interested in obtaining Class A (Master’s level) certification for secondary school teaching in English should consider the Non-Traditional Fifth-Year Program. See the description of the program in the Education section of the Graduate Catalog for more details. Contact the Education Department for preliminary advisement on admission and general program requirements. The English Department will assist in devising a program of study.

TESOL Certificate

The English Department offers a 15 credit hour certificate in the Teaching of English to Speakers of Other Languages (TESOL). The certificate courses in Applied English Linguistics prepare students for classroom instruction, testing, and material evaluation and preparation in the area of TESOL. The Certificate is awarded upon completion of an appropriate master’s degree and the following five courses: EH 505, 507, 508, 609, and 610. Students who wish to apply EH 505, 507 and 508 towards completion of the certificate must take these courses at the graduate level. EH 505, 507 and 508 may apply to requirements for both the M.A. degree in English and the certificate. EH 609 and 610 may only be counted towards completion of the certificate. Students who already possess an appropriate master’s degree may earn the certificate by taking the five required courses; no more than six credit hours of relevant graduate level course work taken at another institution may be applied towards the certificate requirements.

Graduate English (EH) Courses

The following are advanced undergraduate courses (500 level) open to graduate students, who must carry out special assignments over and above those required of undergraduates.

500 Literary Criticism and Theory 3 hrs.
Major texts and approaches from Plato to the present.

501 Special Topics in Writing 3 hrs.
Analysis and research on a topic to be announced in advanced.

505 Survey of General Linguistics 3 hrs.
A survey of the field of linguistics, including language typology, distribution of major languages of the world, cognition, topics in socio- and psycholinguistics, theories of grammar, and an introduction to writing mini-grammars. Course draws on comparative examples of English with other world languages.

506 Introduction to Old English 3 hrs.
Introduction to the phonology, morphology, and syntax of Old English; intensive reading of Old English prose and verse texts which characterize the Anglo-Saxons.

An advanced grammar course which includes traditional and contemporary analyses of major English syntactic patterns; dialect studies; analysis of style; selected socio- and psycho-linguistic topics.
508 History of the English Language 3 hrs.
Phonological, morphological, syntactic, and semantic changes in the English language from the pre-Anglo-Saxon period to the modern English period; historical events that have influenced and effected these changes.

530 Special Studies in American Literature 3 hrs.
Topics announced in advance.

532 Southern Literature 3 hrs.
Selected figures and movements from colonization to the present.

533 William Faulkner 3 hrs.
Biography, background, and critical study of the major novels.

540 Special Studies in English Literature 3 hrs.
Topics announced in advance.

551 Middle English Literature 3 hrs.
The literature of later medieval England, excluding Chaucer, chosen from the Gawain poet, Malory, romance and dream vision, the drama, and the short poem.

571 Renaissance Drama 3 hrs.
Major plays of the sixteenth and early seventeenth centuries, including Marlowe, Jonson, and others. Excludes Shakespeare.

Major novelists: their depiction of reality in response to the post-Darwinian world.

609 Applied English Linguistics II: Strategies for Research and Teaching in TESOL 3 hrs.
Studies in the theoretical and applied aspects of contrastive analyses in teaching English as a second language (TESOL). Contrastive analysis between English and a variety of foreign languages with attention to pedagogical issues. Prerequisite: graduate standing and completion of EH 507 or 508.

610 Applied English Linguistics III: Practicum in TESOL 3 hrs.
Current issues, techniques and materials in teaching English to speakers of other languages (TESOL). Direct and supervised teaching of English to non-native speakers of English. Prerequisite: graduate standing and completion of EH 609, or permission of the instructor.

618 Studies in Women and Literature 3 hrs.
Selected authors, genres and issues.

620 Studies in Modern Poetry 3 hrs.
Selected British and American poets studied in detail.

630 Studies in American Literature to 1865 3 hrs.
Major movements from Colonial times to 1865; selected major figures or special problems.

631 Studies in American Literature since 1865 3 hrs.
Major movements since 1865; selected major figures or special problems.

649 Special Studies 3 hrs.
Study of one or more writers, genres, groups, or movements; announced in advance.

650 Chaucer 3 hrs.
The Canterbury Tales, Troilus and Criseide, and other works studied in relation to relevant literary and religious traditions.

660 Shakespeare 3 hrs.
Selected Shakespearean plays, with special attention to the major criticism, problems of interpretation, and current issues in Shakespearean study.
665 **Renaissance Poetry and Prose** 3 hrs.
The period defined in terms of its principal movements, with attention to the major English authors, such as More, Wyatt, Sidney, Spenser, Marlowe, and Shakespeare, and selected continental predecessors.

670 **Milton** 3 hrs.
A study of Milton's canon: the development of his thought and art through the early work and the prose, culminating in a study of the three major works, especially *Paradise Lost*.

680 **Eighteenth-Century Studies** 3 hrs.
Extensive and intensive study of important themes in the poetry, drama, fiction, and non-fictional prose of major eighteenth-century writers.

690 **Studies in English Romanticism** 3 hrs.
Selected poetry and critical prose with attention to aesthetic theory and philosophical and psychological backgrounds.

691 **Studies in the Victorian Period** 3 hrs.
Representative writing, both poetry and prose, with emphasis on social and cultural changes that inform the literature.

699 **Master's Thesis** 3 hrs.
Required each term during which a student is working and receiving direction on his or her master's thesis. No more than 6 hours' credit may be applied toward the degree.

**Foreign Languages and Literatures Department**
Professor White (acting chair), Professor Emeritus Penot; Associate Professor Emerita Heller, Associate Professor Goebel; Assistant Professors Buksa, Cáchán, Hahn, Helms, Meister, Nielsen, Stromecky, Traylor; Lecturer: Pitfield

**French, German, Japanese*, Latin*, Russian, Spanish**

Acquisition of a second language, and through it an understanding of another culture, is not only a personally enriching experience, it is also, today, a valuable and salable commodity. The language programs are designed to enable effective use of modern foreign language, both oral and written, in social, business and professional life.

The department offers the B.A. in French and German, minors in French, German, Russian, and Spanish, and participates in the Russian Area Studies Program, a B.A. degree program. A composite major in Foreign Languages and International Trade (in cooperation with the College of Administrative Science) with French, German, Russian, or Spanish is also available and leads to a B.A. degree. *Japanese and Latin courses can be taken to satisfy the language requirements or as electives.

**General Education Requirements and Placement Procedures**

Twelve semester hours of credit in one foreign language are required for the B.A. and can be an option in the B.S. degree unless the student can demonstrate a competence at a level more advanced than the beginning 101 course. French, German, Russian and Spanish courses at 100 and 200 level are taught at least twice each calendar year.

Students with a prior knowledge of French, German or Spanish may take the CLEP examination for the equivalent of 101 and 102. Irrespective of the resultant placement, the student will have to take a minimum of six additional hours of course work to fulfill the language requirement. The test is administered by the UAH Testing Services and must be taken prior to enrollment in foreign language classes. Tests are given quarterly: see Testing Services for dates.
Interested students should contact the respective foreign language coordinator for further information. By taking the CLEP test, a student may receive credit hours with no quality points depending on placement level and score. Since there is no CLEP test for Russian, students of that language may take a special departmental test under the same conditions as the CLEP examination. See the Russian language coordinator.

Native and quasi-native speakers of foreign language may not take introductory and intermediate courses, nor the first advanced conversation course in that language. Students in this category must make an appointment with the appropriate language coordinator to take a departmental placement examination. They may earn up to fifteen hours of credit with no quality points and must still take a minimum of six additional hours of course work.

Students who studied a foreign language in high school will be placed according to the following scale:

<table>
<thead>
<tr>
<th>Placement Level</th>
<th>Language in High School</th>
<th>Courses to be Taken to Satisfy Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Level (101)</td>
<td>0-1 units</td>
<td>101, 102, 201, 202</td>
</tr>
<tr>
<td>2nd level (102)</td>
<td>1-2 units</td>
<td>102, 201, 202</td>
</tr>
<tr>
<td>3rd level (201)</td>
<td>2-3 units</td>
<td>201, 202</td>
</tr>
<tr>
<td>4th level (202)</td>
<td>3-4 plus</td>
<td>202 plus one 300 level course</td>
</tr>
</tbody>
</table>

*Minimum grade of C required for a unit to be counted.

If an interval of two years or more occurs between study of a language in high school and continuation of that language in college, placement levels may be adjusted downward to entry level.

The Foreign Language Department will award credit to students who have earned a score of three or higher on Advanced Placement (AP) Program examinations of the College Entrance Examination Board according to the following scale:

- Score of 3: 9 hours credit (i.e. through 201)
- Score of 4: 12 hours credit (through 202)
- Score of 5: 15 hours credit (through 301)

The credit thus awarded will be recorded without grades or quality points and will not therefore, be included in the calculation of the grade-point average.

Moreover, regardless of the student’s AP score, he or she will be required to complete successfully two additional courses (6 credit hours) of the appropriate language.

Foreign Language Major
A foreign language major consists of 24 semester hours above the basic course sequence in a single language. Students beginning the language on the 101 level must take a total of 36 hours.

A student seeking teacher certification in a language must take 36 semester hours of credit in the language of choice. Nine hours or three courses must be at the 300 level and six hours or two courses must be at the 400 level. See further instructions under Programs involving Teacher Education/Certification.

A transfer student declaring a major or minor must have a minimum of six (6) hours of upper-level credit earned at U.A.H. in the language studied.

Foreign Language Minor
A foreign language minor consists of 12 semester hours above the basic-course sequence in a single language. Students beginning the language on the 101 level must take a total of 24 semester hours. Conversation, advanced grammar and composition, and one of the introduc-
tion to literature courses are required. An additional course on the 300 or 400 level completes the requirement for the minor. Students beginning the language on the 300 level must still take a total of 21 hours even if they exceed the 12 hours above the basic course sequence normally required for a minor.

Program of Study Models
Students majoring in a foreign language will find a Program of Study which enables them to develop depth and breadth in the major and related areas: other languages, humanities, social and behavioral sciences, mathematics, engineering, natural sciences, and elementary education. Students who wish to plan their own Program of Study should do so in consultation with a member of the particular language faculty. This Program of Study may also be used for teaching certification.

Program of Study with French Major
Required courses: FH 301, 302, 305, 306, three courses on the 400 level, and one elective from either the 300 or 400 level.

Program of Study with German Major
Required courses: GN 301, 302, 305 306, three courses on the 400 level, and one elective from either the 300 or 400 level.

Program of Study with Slavic Area Studies Major
The Slavic Area Major is an enrichment program which prepares students for careers in government, industry, international commerce and trade, and other related areas of work, while providing the necessary preparation for graduate level studies.
Drawing from three disciplines, foreign languages and literatures, history and political science, the program places emphasis on Russian Studies with strong supporting work in history and political science.
Slavic Area Studies offers the student intensive training aimed at the development of competency in more than one area. Requirements for the Slavic Area Studies Majors are:

<table>
<thead>
<tr>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>RN 101, 102, 201, 202, 301, 302, 304, 305, 306, and three 400-level courses</td>
</tr>
<tr>
<td>HY 101, 102, 375, 376, 479 and 490</td>
</tr>
<tr>
<td>PSC 101, 135, and nine hours drawn from 246, 336, 337 and 338</td>
</tr>
<tr>
<td>Total 69</td>
</tr>
</tbody>
</table>

Foreign Languages and International Trade
The department offers a degree program that combines the study of a foreign language, administrative science, and other disciplines related to international trade. Such a program of study opens up a broad variety of career opportunities in the multinational and multilingual business arena of today.
In addition to the general education requirements for the B.A. degree, the student’s program must include the following courses:
### Foreign Languages

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediate Foreign Language (French, German, Russian or Spanish)</td>
<td>6 Hrs.</td>
</tr>
<tr>
<td>301 Conversation</td>
<td>3 Hrs.</td>
</tr>
<tr>
<td>302 Advanced Composition</td>
<td>3 Hrs.</td>
</tr>
<tr>
<td>303 Business and Professions</td>
<td>3 Hrs.</td>
</tr>
<tr>
<td>304 Culture</td>
<td>3 Hrs.</td>
</tr>
<tr>
<td>305 or 306 Survey of Literature</td>
<td>3 Hrs.</td>
</tr>
<tr>
<td>400 Foreign Language Electives</td>
<td>6 Hrs.</td>
</tr>
<tr>
<td>410 Practicum</td>
<td>3 Hrs.</td>
</tr>
<tr>
<td>Total</td>
<td>30 Hrs.</td>
</tr>
</tbody>
</table>

### Administrative Science Cognate

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECN 142, 143 Principles of Economics</td>
<td>6 Hrs.</td>
</tr>
<tr>
<td>ACC 211, 221 Principles of Accounting I</td>
<td>3 Hrs.</td>
</tr>
<tr>
<td>ACC 212, 222 Principles of Accounting II</td>
<td>3 Hrs.</td>
</tr>
<tr>
<td>BLS 211 Legal Environment of Business</td>
<td>3 Hrs.</td>
</tr>
<tr>
<td>FIN 301 Principles of Finance</td>
<td>3 Hrs.</td>
</tr>
<tr>
<td>MGT 301 Principles of Management</td>
<td>3 Hrs.</td>
</tr>
<tr>
<td>MKT 301 Principles of Marketing</td>
<td>3 Hrs.</td>
</tr>
<tr>
<td>Administrative Science/International Business elective (one course selected from FIN 454, MGT 450, or MKT 415)</td>
<td>3 Hrs.</td>
</tr>
<tr>
<td>Total</td>
<td>27 Hrs.*</td>
</tr>
</tbody>
</table>

*In no case may the Administrative Science courses included in a student’s program of study exceed 25 percent of the student’s program.

### Other Requirements**

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHS 300 Statistical Analysis</td>
<td>3 Hrs.</td>
</tr>
<tr>
<td>HY 392 Europe Since 1815</td>
<td>3 Hrs.</td>
</tr>
<tr>
<td>HY 479 Modern Europe</td>
<td>3 Hrs.</td>
</tr>
<tr>
<td>HY 490 Research Seminar in History</td>
<td>3 Hrs.</td>
</tr>
<tr>
<td>PSC 343 International Law and Organization</td>
<td>3 Hrs.</td>
</tr>
<tr>
<td>HY 337 Contemporary Latin America</td>
<td>3 Hrs.</td>
</tr>
<tr>
<td>HY 341 Modern France</td>
<td>3 Hrs.</td>
</tr>
<tr>
<td>HY 343 Modern Germany</td>
<td>3 Hrs.</td>
</tr>
<tr>
<td>HY 376 Twentieth Century Russia</td>
<td>3 Hrs.</td>
</tr>
<tr>
<td>Total</td>
<td>18 Hrs.</td>
</tr>
</tbody>
</table>

**These courses may be counted as part of the general education requirements where appropriate.

### Programs Involving Teacher Education/Certification

A student majoring in Elementary Education may utilize French, German, Russian or Spanish for a Cognate area (second area of study). The cognate area in foreign languages will total 27 hours and must include 15 hours of courses 300 level or above, 9 hours of which must be 300 level courses and 6 hours which must be 400 level courses. A student seeking certification in Middle/Junior High School Education or High School Education who wishes to have a single
teaching field in French, German, Russian or Spanish must conform to the requirements of a language major.

In Teacher Education/Certification Programs students are advised to seek help from a faculty advisor from the Department of Foreign Languages and Literatures for the selection and approval of courses. Students are also advised to see total degree requirements under the Education section of the catalog.

**French (FH)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>Elementary French I</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Lab fee: Level 3</td>
<td></td>
</tr>
<tr>
<td>102</td>
<td>Elementary French II</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Lab fee: Level 3 Prerequisite: FH 101 or placement.</td>
<td></td>
</tr>
<tr>
<td>201</td>
<td>Intermediate French I</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Lab fee: Level 3 Prerequisite: FH 102 or placement.</td>
<td></td>
</tr>
<tr>
<td>202</td>
<td>Intermediate French II</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Lab fee: Level 3 Prerequisite: FH 201 or placement.</td>
<td></td>
</tr>
<tr>
<td>301</td>
<td>French Conversation</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Oral drills, pronunciation exercises, and simple oral reports. Prerequisite: FH 202.</td>
<td></td>
</tr>
<tr>
<td>302</td>
<td>Advanced French Composition</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Composition with emphasis on grammar review and idiomatic expression. Prerequisite: FH 202, or approval of instructor.</td>
<td></td>
</tr>
<tr>
<td>303</td>
<td>French for Business and Professions</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>The reading and translation of materials, documents, and forms pertinent to commerce and professions. Prerequisite: FH 202 or approval of instructor.</td>
<td></td>
</tr>
<tr>
<td>304</td>
<td>French Culture</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Cultural patterns of French-speaking peoples. Prerequisite: FH 202 or approval of instructor.</td>
<td></td>
</tr>
<tr>
<td>305</td>
<td>Survey of French Literature I</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>French literature from the medieval period through the eighteenth century. Prerequisite: FH 301, FH 302 or approval of instructor.</td>
<td></td>
</tr>
<tr>
<td>306</td>
<td>Survey of French Literature II</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>French literature from 1800 to the present. Prerequisite: FH 301, FH 302 or approval of instructor.</td>
<td></td>
</tr>
<tr>
<td>403</td>
<td>Sixteenth Century French Literature</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Intellectual, philosophical, and aesthetic trends and developments in Renaissance France, using representative works of the period. Prerequisite: FH 305 or 306 or approval of instructor.</td>
<td></td>
</tr>
<tr>
<td>404</td>
<td>Seventeenth Century French Literature</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Masterpieces of the period with emphasis on the plays of Corneille, Racine, and Molière. Prerequisite: FH 305 or 306 or approval of instructor.</td>
<td></td>
</tr>
<tr>
<td>405</td>
<td>Eighteenth Century French Literature</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>French thought and writing in le Siècle des Lumières. Representative works from Voltaire to Chénier. Prerequisite: FH 305 or 306 or approval of instructor.</td>
<td></td>
</tr>
<tr>
<td>406</td>
<td>Nineteenth Century French Novel</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Principal novelists of the nineteenth century: Balzac, Stendhal, Flaubert, Zola. Prerequisite: FH 305 or 306 or approval of instructor.</td>
<td></td>
</tr>
<tr>
<td>407</td>
<td>French Drama</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>The most influential French dramatists from the nineteenth century to the present. Prerequisite: FH 305 or 306 or approval of instructor.</td>
<td></td>
</tr>
</tbody>
</table>
408 Twentieth Century French Novel 3 hrs.
The most influential French novelists from the beginning of the century to the present. Prerequisite: FH 305 or 306 or approval of the instructor.

409 Famous Women Writers 3 hrs.
Famous feminine writers throughout French Literature: Madame de LaFayette, Madame de Sévigné, Madame de Staël, Georges Sand, Collette, Francoise Sagan, Natalie Sarraute. Prerequisite: approval of instructor.

410 Practicum 3 hrs.
Student oral presentations, guest speakers, periodicals and brochures are utilized for instructional purposes. Prerequisite: FH 303 or approval of instructor.

499 Independent Studies 1-3 hrs.
Prerequisite: approval of department chairman.

German (GN)

101 Elementary German I 3 hrs.
Lab fee: Level 3.

102 Elementary German II 3 hrs.
Lab fee: Level 3. Prerequisite: GN 101 or placement.

201 Intermediate German I 3 hrs.
Lab fee: Level 3. Prerequisite: GN 102 or placement.

202 Intermediate German II 3 hrs.
Lab fee: Level 3. Prerequisite: GN 201 or placement.

301 German Conversation 3 hrs.
Oral practice, communication and reports, emphasizing topics of daily experiences, travels, and contemporary German life. Prerequisite: GN 202 or approval of instructor.

302 Advanced German Composition and Usage 3 hrs.
Composition with emphasis on grammar review and idiomatic expression. Prerequisite: GN 202 or approval of instructor.

303 German for Business and Professions 3 hrs.
The reading and translation of materials, documents, and forms pertinent to commerce and the professions. Prerequisite: GN 202 or approval.

304 German Culture 3 hrs.
German cultural patterns: their causes and effects. Prerequisite: GN 202 or approval of instructor.

305 Survey of German Literature I 3 hrs.
German literature from its beginning to 1785. Prerequisite: GN 301 or GN 302 or approval of instructor.

306 Survey of German Literature II 3 hrs.
German literature from the end of the eighteenth century to the present. Prerequisite: GN 301 or GN 302 or approval of instructor.

410 Practicum 3 hrs.
Student oral presentations, guest speakers, periodicals and brochures are utilized for instructional purposes. Prerequisite: GN 303 or approval of instructor.

412 Goethe, Schiller and Major Writers of Eighteenth Century 3 hrs.
Contributions of Goethe and Schiller to German literature compared with significant works of other writers of the era. Prerequisite: GN 305 or 306 or approval of instructor.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>413</td>
<td>German Romanticism</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>German literature of the romantic period, its philosophy and theory. Prerequisite: GN 305 or 306 or approval of instructor.</td>
<td></td>
</tr>
<tr>
<td>414</td>
<td>The German “Novelle” from Goethe to Kafka</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Important literary genre using representative novellas of the nineteenth and twentieth centuries. Prerequisite: GN 305 or 306 or approval of instructor.</td>
<td></td>
</tr>
<tr>
<td>416</td>
<td>Twentieth Century German Literature</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Writers and works of the twentieth century with emphasis on post-World War II German literature. Prerequisite: GN 305 or 306 or approval of instructor.</td>
<td></td>
</tr>
<tr>
<td>418</td>
<td>Modern German Drama</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>German drama from the nineteenth century to present showing development and diversity of modern German drama. Prerequisite: GN 305 or 306 or approval of instructor.</td>
<td></td>
</tr>
<tr>
<td>419</td>
<td>German Poetry</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Interpretation of selected masterpieces of major German poets from the seventeenth to the twentieth centuries. Prerequisite: GN 305 or 306 or approval of instructor.</td>
<td></td>
</tr>
<tr>
<td>499</td>
<td>Independent Studies</td>
<td>1-3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Prerequisite: approval of department chairman.</td>
<td></td>
</tr>
</tbody>
</table>

**Japanese (JE)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>Elementary Japanese I</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Lab fee: Level 3.</td>
<td></td>
</tr>
<tr>
<td>102</td>
<td>Elementary Japanese II</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Lab fee: Level 3. Prerequisite: JE 101 or placement.</td>
<td></td>
</tr>
<tr>
<td>201</td>
<td>Intermediate Japanese I</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Lab fee: Level 3. Prerequisite: JE 102 or placement.</td>
<td></td>
</tr>
<tr>
<td>202</td>
<td>Intermediate Japanese II</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Lab fee: Level 3. Prerequisite: JE 201 or placement.</td>
<td></td>
</tr>
<tr>
<td>399</td>
<td>Independent Studies</td>
<td>1-3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Prerequisite: Approval of department chair.</td>
<td></td>
</tr>
</tbody>
</table>

**Latin (LN)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>Elementary Latin I</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>102</td>
<td>Elementary Latin II</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Prerequisite: Latin 101 or approval of instructor</td>
<td></td>
</tr>
<tr>
<td>201</td>
<td>Intermediate Latin I</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Prerequisite: Latin 102 or approval of instructor</td>
<td></td>
</tr>
<tr>
<td>202</td>
<td>Intermediate Latin II</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Prerequisite: Latin 201 or approval of instructor</td>
<td></td>
</tr>
<tr>
<td>399</td>
<td>Independent Studies</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Prerequisite: approval of instructor.</td>
<td></td>
</tr>
</tbody>
</table>

**Russian (RN)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>Elementary Russian I</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Lab fee: Level 3.</td>
<td></td>
</tr>
<tr>
<td>102</td>
<td>Elementary Russian II</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Lab fee: Level 3. Prerequisite: RN 101 or placement.</td>
<td></td>
</tr>
<tr>
<td>201</td>
<td>Intermediate Russian I</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Lab fee: Level 3. Prerequisite: RN 102 or placement.</td>
<td></td>
</tr>
<tr>
<td>202</td>
<td>Intermediate Russian II</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Prerequisite: RN 201 or placement. Lab fee: Level 3.</td>
<td></td>
</tr>
</tbody>
</table>
301 **Russian Conversation**
Prerequisite: RN 202 or approval of instructor.

302 **Advanced Grammar and Composition**
Prerequisite: RN 202 or approval of instructor.

303 **Russian for Business and Professions**
The reading and translation (two-way) of materials, documents, and forms pertinent to commerce and the professions. Individualized instruction. Prerequisite: RN 202 or approval of instructor.

304 **Russian Culture**
Russian cultural patterns: their causes and effects. Prerequisite: RN 202 or approval of instructor.

305 **Survey of Russian Literature I**
Russian literature from its beginning to Pushkin. Prerequisite: RN 301 or RN 302 or approval of instructor.

306 **Survey of Russian Literature II**
Russian literature from Pushkin to the present. Prerequisite: RN 301 or RN 302 or approval of instructor.

410 **Practicum**
Student oral presentations, guest speakers, periodicals and brochures are utilized for instructional purposes. Prerequisite: RN 303 or approval of instructor.

433 **Major Writers of the Nineteenth Century**
Representative works from Pushkin through Chekhov. Prerequisite: RN 305 or 306 or approval of instructor.

438 **Russian Poetry**
Russian verse from its beginning to Pushkin. An examination of Russian literary-poetic language, with consideration of the role of Church Slavonic, regional dialects, and foreign influences as well as the contribution of particular authors. Prerequisite: RN 202.

439 **Gogol**
Gogol's major works, especially *Dead Souls*. An examination of his style, philosophy and technique. Prerequisite: RN 305 or 306 or approval of instructor.

440 **Dostoevsky**
Major works by Dostoevsky, regarding style, ideology, philosophies, and technique. Prerequisite: RN 305 or 306 or approval of instructor.

499 **Independent Studies**
Prerequisite: approval of department chairman.

**Spanish (SH)**

101 **Elementary Spanish I**
Lab fee: Level 3.

102 **Elementary Spanish II**
Lab fee: Level 3. Prerequisite: SH 101 or placement.

201 **Intermediate Spanish I**
Lab fee: Level 3. Prerequisite: SH 102 or placement.

202 **Intermediate Spanish II**
Lab fee: Level 3 Prerequisite: SH 201 or placement.

301 **Spanish Conversation and Pronunciation**
Prerequisite: SH 202 or approval of instructor.
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>302</td>
<td>Advanced Spanish Grammar and Composition</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>303</td>
<td>Spanish for Business and Professions</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>304</td>
<td>Hispanic Culture</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>305</td>
<td>Survey of Spanish Literature I</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>306</td>
<td>Survey of Spanish Literature II</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>307</td>
<td>Survey of Spanish American Literature I</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>308</td>
<td>Survey of Spanish American Literature II</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>410</td>
<td>Practicum</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>423</td>
<td>Cervantes</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>424</td>
<td>Golden Age Drama</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>427</td>
<td>Spanish American Novel</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>429</td>
<td>The Generation of '98</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>499</td>
<td>Independent Studies</td>
<td>1-3 hrs.</td>
</tr>
</tbody>
</table>

**Health and Physical Education Program**

**Director:** Dr. Joe Manjone

**Health and Physical Education Offerings**

Fitness, active participation, and good health habits are essential in modern society. Through a variety of health and physical education activity courses, (HPE 100 through 199) the student can increase fitness, learn skills for a lifetime of participation, and gain a conceptual knowledge of health practices and skills.

**Activity Courses**

These activity courses carry 1 semester hour of credit with no more than 6 hours counting toward graduation. In the College of Science, no more than 3 hours may count toward gradu-
ation. Courses may not be repeated for credit except for varsity sports credit. Grades of satisfactory or unsatisfactory are given, based primarily on a student’s improvement in skill rather than on the level of ability or knowledge brought to the course. A participant in a varsity sport may not enroll in a regular activity course in that sport.

Professional Training Courses
Because of demonstrated community need, courses (HPE 200 through 500) that provide professional training in aspects of Health and Physical Education and related fields are offered in the HPE program. Many of these courses meet certification standards with certificates awarded upon completion. They require both skill and academic training. Normal letter-grade system and other academic standards apply to such courses.

Health and Physical Education (HPE)

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Lab Fee</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Fitness Enhancement</td>
<td>Lab fee: Level 1</td>
<td>1 hr.</td>
</tr>
<tr>
<td>101</td>
<td>Slimnastics</td>
<td>Lab fee: Level 1</td>
<td>1 hr.</td>
</tr>
<tr>
<td>102</td>
<td>Aerobic Dance I</td>
<td>Lab fee: Level 1</td>
<td>1 hr.</td>
</tr>
<tr>
<td>103</td>
<td>Jogging for Fitness and Weight Control</td>
<td>Lab fee: Level 1</td>
<td>1 hr.</td>
</tr>
<tr>
<td>104</td>
<td>Beginning Weight Training</td>
<td>Lab fee: Level 1</td>
<td>1 hr.</td>
</tr>
<tr>
<td>105</td>
<td>Beginning Karate</td>
<td>Lab fee: Level 1</td>
<td>1 hr.</td>
</tr>
<tr>
<td>106</td>
<td>Beginning T’ai Chi</td>
<td>Lab fee: Level 1</td>
<td>1 hr.</td>
</tr>
<tr>
<td>107</td>
<td>Beginning Stunts and Tumbling</td>
<td>Lab fee: Level 1</td>
<td>1 hr.</td>
</tr>
<tr>
<td>108</td>
<td>Yoga</td>
<td>Lab fee: Level 1</td>
<td>1 hr.</td>
</tr>
<tr>
<td>109</td>
<td>Bicycle Touring</td>
<td>Lab fee: Level 1</td>
<td>1 hr.</td>
</tr>
<tr>
<td>110</td>
<td>Beginning Swimming</td>
<td>Lab fee: Level 2</td>
<td>1 hr.</td>
</tr>
<tr>
<td>111</td>
<td>Swimmastics</td>
<td>Lab fee: Level 1</td>
<td>1 hr.</td>
</tr>
<tr>
<td>112</td>
<td>Deep Water Workout</td>
<td></td>
<td>1 hr.</td>
</tr>
<tr>
<td>113</td>
<td>Basic Sailing</td>
<td>Lab fee: Level 4</td>
<td>1 hr.</td>
</tr>
<tr>
<td>114</td>
<td>Sailboat Cruising</td>
<td>Lab fee: variable</td>
<td>1 hr.</td>
</tr>
<tr>
<td>115</td>
<td>Badminton</td>
<td>Lab fee: Level 1</td>
<td>1 hr.</td>
</tr>
<tr>
<td>116</td>
<td>Racquetball</td>
<td>Lab fee: Level 1</td>
<td>1 hr.</td>
</tr>
<tr>
<td>117</td>
<td>Beginning Tennis</td>
<td>Lab fee: Level 1</td>
<td>1 hr.</td>
</tr>
<tr>
<td>119</td>
<td>Windsurfing</td>
<td>Lab fee: Level 3</td>
<td>1 hr.</td>
</tr>
<tr>
<td>120</td>
<td>Beginning Roller Skating</td>
<td>Lab fee: Level 1</td>
<td>1 hr.</td>
</tr>
<tr>
<td>121</td>
<td>Ice Skating</td>
<td>Lab fee: Level 4</td>
<td>1 hr.</td>
</tr>
<tr>
<td>122</td>
<td>Social Dance</td>
<td>Lab fee: Level 1</td>
<td>1 hr.</td>
</tr>
<tr>
<td>124</td>
<td>Backpacking</td>
<td>Lab fee: Level 2</td>
<td>1 hr.</td>
</tr>
<tr>
<td>125</td>
<td>Basic Horseback Riding</td>
<td>Lab fee: Level 12</td>
<td>1 hr.</td>
</tr>
<tr>
<td></td>
<td>(all-weather indoor arena available.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>126</td>
<td>Beginning Golf</td>
<td>Lab fee: Level 6</td>
<td>1 hr.</td>
</tr>
<tr>
<td>127</td>
<td>Beginning Bowling</td>
<td>Lab fee: Level 3</td>
<td>1 hr.</td>
</tr>
<tr>
<td>128</td>
<td>Speleology</td>
<td>Lab fee: Level 1</td>
<td>1 hr.</td>
</tr>
<tr>
<td>129</td>
<td>Snow Skiing</td>
<td>Lab fee: Variable</td>
<td>1 hr.</td>
</tr>
<tr>
<td>130</td>
<td>Basketball</td>
<td>Lab fee: Level 1</td>
<td>1 hr.</td>
</tr>
<tr>
<td>131</td>
<td>Volleyball</td>
<td>Lab fee: Level 1</td>
<td>1 hr.</td>
</tr>
<tr>
<td>132</td>
<td>Softball</td>
<td>Lab fee: Level 1</td>
<td>1 hr.</td>
</tr>
<tr>
<td>133</td>
<td>Soccer</td>
<td>Lab fee: Level 1</td>
<td>1 hr.</td>
</tr>
<tr>
<td>136</td>
<td>Jazz Dance</td>
<td>Lab fee: Level 1</td>
<td>1 hr.</td>
</tr>
<tr>
<td>137</td>
<td>Intermediate Jazz Dance</td>
<td>Lab fee: Level 1</td>
<td>1 hr.</td>
</tr>
<tr>
<td>138</td>
<td>Fencing</td>
<td>Lab fee: Level 4</td>
<td>1 hr.</td>
</tr>
<tr>
<td>139</td>
<td>Hand Gliding Fundamentals</td>
<td>Lab fee: Level 1</td>
<td>1 hr.</td>
</tr>
</tbody>
</table>
140 Intermediate Ice-Skating; Lab fee: Level 4 1 hr.
141 Intermediate Swimming; Lab fee: Level 2 1 hr.
142 Intermediate Karate; Lab fee: Level 1 1 hr.
143 Intermediate Tennis; Lab fee: Level 1 1 hr.
144 Intermediate Racquetball; Lab fee: Level 1 1 hr.
145 Intermediate Swimnastics; Lab fee: Level 1 1 hr.
146 Intermediate Stunts and Tumbling; Lab fee: Level 1 1 hr.
147 Intermediate Golf; Lab fee: Level 6 1 hr.
148 Intermediate Roller Skating; Lab fee: Level 1 1 hr.
149 Aerobic Dance II; Lab fee: Level 1 1 hr.
151 Advanced Tennis; Lab fee: Level 1 1 hr.
152 Advanced Karate; Lab fee: Level 1 1 hr.
153 Advanced Swimnastics; Lab fee: Level 1 1 hr.
154 Advanced Racquetball; Lab fee: Level 1 1 hr.
155 Ballet; Lab fee: Level 1 1 hr.
156 Advanced Weight Training; Lab fee: Level 1 1 hr.
157 Advanced Bowling; Lab fee: Level 3 1 hr.
159 Aerobic Dance III; Lab fee: Level 1 1 hr.
160 Intermediate T'ai Chi; Lab fee: Level 1 1 hr.
161 Water-Safety Instruction; Lab fee: Level 2 1 hr.
162 Horseback Riding II - Field Riding; Lab fee: Level 12 1 hr.
163 Advanced Roller Skating; Lab fee: Level 1 1 hr.
164 Basic Shooting; Lab fee: Level 3 1 hr.
167 Intermediate Weight Training; Lab fee: Level 1 1 hr.
168 Intermediate Social Dance; Lab fee: Level 1 1 hr.
169 Basic Rowing; Lab fee: Level 1 1 hr.
170 Varsity Sports - Basketball; Lab fee: Level 1 1 hr.
171 Varsity Sports - Soccer; Lab fee: Level 1 1 hr.
172 Varsity Sports - Crew; Lab fee: Level 1 1 hr.
173 Varsity Sports - Tennis; Lab fee: Level 1 1 hr.
174 Varsity Sports - Ice Hockey; Lab fee: Level 1 1 hr.
176 Varsity Sports - Volleyball; Lab fee: Level 1 1 hr.
177 Varsity Sports - Golf; Lab fee: Level 1 1 hr.
178 Varsity Sports - Cross Country; Lab fee: Level 1 1 hr.
179 Varsity Sports - Athletic Training; Lab fee: Level 1 1 hr.
199 Special Topics in Health and Physical Education; Lab fee: Variable 1 hr.

Professional Courses

210 Basketball Officiating 2 hrs.
Techniques, mechanics, and rules involved in officiating basketball for certification as an Alabama high school official. Experience and skill necessary to officiate basketball on elementary, secondary, and recreational levels.

211 Football Officiating 2 hrs.
Techniques, mechanics, and rules involved in officiating football for certification as an Alabama high school official. Experience and skills necessary to officiate football on elementary, secondary, and recreational levels.

212 Baseball and Softball Officiating 2 hrs.
Baseball and softball officiating techniques, mechanics, and rules for certification as an Alabama high school baseball official and an Amateur Softball Association umpire. Experience and skills necessary to officiate baseball and softball on various interscholastic and recreational levels.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>213</td>
<td>Soccer Officiating</td>
<td>2 hrs.</td>
<td>Techniques, mechanics, and rules involved in the officiating of soccer. Experience and skills necessary to officiate soccer on elementary, secondary, and recreational levels. Lab fee: Level 1.</td>
</tr>
<tr>
<td>220</td>
<td>Scuba</td>
<td>2 hrs.</td>
<td>Basic skills, theories, techniques, and fundamentals of scuba-diving introduced, practiced, and refined. Open water diving. Scuba certification upon successful completion of course. Prerequisite: Instructor approval. Lab fee: Level 5.</td>
</tr>
<tr>
<td>221</td>
<td>Advanced Scuba</td>
<td>1 hr.</td>
<td>Lecture and dives necessary to earn a YMCA-Silver Star Water Rating. Lab fee: TBA</td>
</tr>
<tr>
<td>223</td>
<td>Lifeguard Training</td>
<td>2 hrs.</td>
<td>Certification as a Red Cross approved Lifeguard upon successful completion of classroom and in-water instruction and testing. Lab fee: Level 2</td>
</tr>
<tr>
<td>269</td>
<td>Private Pilot Ground School</td>
<td>3 hrs.</td>
<td>Prepares student for FAA Private Pilot written exam. Provides student with necessary knowledge to progress into primary pilot flight training. Lab fee: Level 1.</td>
</tr>
<tr>
<td>290</td>
<td>Care and Prevention of Athletic Injuries</td>
<td>3 hrs.</td>
<td>Provides working knowledge of the care and prevention of athletic injuries. For teachers, coaches, athletes, parents and those working in recreation, physical education, or athletics. Lab fee: Level 2.</td>
</tr>
<tr>
<td>291</td>
<td>CPR Instructor</td>
<td>1 hr.</td>
<td>Twenty-five hours of comprehensive techniques in the basics and instruction of cardiopulmonary resuscitation. Upon successful completion of the course, student is certified as a CPR Instructor. Lab fee: Level 3.</td>
</tr>
<tr>
<td>299</td>
<td>Field Work in Athletics, Physical Education, or Leisure Services</td>
<td>2 hrs.</td>
<td>Planned supervised 80-hour work experience with a physical education, athletic, or leisure service program. Written reports, a major project, and final oral report are required. Lab fee: Level 1.</td>
</tr>
<tr>
<td>500</td>
<td>Boating Safety</td>
<td>3 hrs.</td>
<td>Techniques for teaching boating safety to elementary and secondary students. The Alabama Better Boating Home-study course, The Alabama young Boatmen’s Program, and water skiing safety will be stressed. Instructor’s rating in boating safety will be awarded upon successful completion. Lab fee: Level 1.</td>
</tr>
</tbody>
</table>
History Department

Professors J. White (Chair), Boucher, Shields, C. White; Professor Emerita Roberts; Associate Professors Dunar, Gerberding, Williams; Associate Professor Emerita Parker; Assistant Professors Leslie, Patton, Waring, Wren.

The Department of History offers the B.A. and M.A. degrees in history, and a minor in history.

History Major

A student in history must include in his or her academic program a minimum of 33 semester hours in history beyond HY 101-102 (GER). The U.S. survey courses, HY 221-222 are required. A student is required to take an additional 3 semester hours of sophomore work, but may take no more than a total of 12 semester hours in 200 level work including HY 221-222. A history major must take a minimum of 21 semester hours in courses numbered 300 or above; 9 semester hours must be 400 level courses, and must include HY 490. A history major is required to take a minimum of 6 semester hours in American history beyond HY 221 and 222 and a minimum of 6 semester hours in non-American history excluding HY 101-102 (GER). Students are encouraged to complete as many upper division courses as possible before enrolling in HY 490.

History students may also pursue an already approved and published composite major such as the Russian Area Studies Program. As currently established a composite major consists of a minimum of 36 semester hours 24 of which must be upper division. In the Russian Area Studies Program, history contributes six courses beyond HY 101-102 (GER), three of which must be upper division and include HY 490, and three courses chosen by the student in conjunction with his or her history advisor from sophomore, junior or senior levels.

A student majoring in history will find a variety of programs of study enabling him or her to develop depth and breadth in history and some related areas from the other humanities, the social sciences, mathematics, and the natural sciences. Counseling is available in the History Department for programs of study including the following: graduate school preparation, general, preprofessional and prelaw preparation, international studies, secondary school teaching, and the fine arts. A student who wishes to plan his or her own program of study can do so through his or her history advisor and with the coordination of the Department Chair.

History Minor

A student interested in establishing a history minor should include appropriate history courses involving a minimum of 21 semester hours beyond HY 101-102 (GER) and including 12 semester hours in courses numbered 300 or above. The minor program must have the approval of the History Department chairman. Appropriate history courses may also form a part of an area of cognate studies with other disciplines to support another major program. Such a program must be approved by the student’s major department and must meet the requirement of a minimum of 12 upper division semester hours, of which 9 hours must be in history.

History for Second Area of Study

Students majoring in elementary education may select history as their second area of study. Major requirements can be found in the Education section of the catalog. Preliminary counseling is available in the Department of Education.

Advanced Placement Credit

Elective credit will be given to AP American History students with the score of 5. This course may be used in substitution for HY 221 and HY 222 at U.A.H. Under no circumstances may
AP American History be used as a substitute for HY 101 and/or HY 102. The AP European History course (1470-Present) may be used as a substitute for HY 102 only. A maximum of 3 hours credit will be granted to students who score 5. In order to fulfill GER requirements AP students will still have to take HY 101 or its equivalency as approved by the department.

History (HY)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>Origins and Development of the Contemporary World, Part I</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Major Western civilizations to 1500. Taught every term.</td>
<td></td>
</tr>
<tr>
<td>102</td>
<td>Origins and Development of the Contemporary World, Part II</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Major Western civilizations since 1500. Taught every term.</td>
<td></td>
</tr>
</tbody>
</table>

Courses below are open to all students other than beginning freshmen, with exceptions as indicated.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>221</td>
<td>The United States to 1877</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>The discovery of America through the Civil War and Reconstruction. Taught twice annually.</td>
<td></td>
</tr>
<tr>
<td>222</td>
<td>The United States Since 1877</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>The United States from the end of the Civil War era to the present. Taught twice annually.</td>
<td></td>
</tr>
<tr>
<td>225</td>
<td>History of Alabama</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>The state's past from colonial times to the present with emphasis on its place in United States history.</td>
<td></td>
</tr>
<tr>
<td>229</td>
<td>Survey of Ancient Times</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>The ancient Near East, Greece, and Rome. Prerequisites: HY 101-102 or approval of instructor.</td>
<td></td>
</tr>
<tr>
<td>230</td>
<td>The Rise of Medieval Civilizations</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>A survey of the origins and development of the medieval world, with attention given to Byzantium and the Islamic world, as well as to the Latin west. Prerequisites: HY 101 and 102 or permission of instructor.</td>
<td></td>
</tr>
<tr>
<td>245</td>
<td>Sub-Saharan Africa</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>A survey of the people of the land south of the Sahara Desert, especially in the Nile River Valley and along the Ivory and Gold coasts emphasizing their history, culture, and political systems.</td>
<td></td>
</tr>
</tbody>
</table>

Courses listed below are open to students who have completed 12 semester hours in history or have junior standing.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>318</td>
<td>Constitutional History of the United States</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>A study of the growth and development of the American Constitutional system with emphasis on those aspects of Constitutional growth which relate to the fundamental structure of American government and social order.</td>
<td></td>
</tr>
<tr>
<td>329</td>
<td>Imperial Rome</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>History of the Roman Empire from the Principate to the barbarian invasions.</td>
<td></td>
</tr>
<tr>
<td>337</td>
<td>Latin America and the United States</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Political and diplomatic relations between Latin America and the United States in the nineteenth and twentieth centuries.</td>
<td></td>
</tr>
<tr>
<td>341</td>
<td>Modern France</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Political, economic, social, and cultural developments from the opening of the reign of Louis XIV to the post-de Gaulle era of the Fifth Republic. Prerequisites: HY 101-102.</td>
<td></td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credit Hours</td>
</tr>
<tr>
<td>-------------</td>
<td>--------------------------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>343</td>
<td>Modern Germany</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Modern German history from the Congress of Vienna in 1815 through the Second World War and Germany’s role in current history. Political, economic, and cultural factors in the development of the German nation. Prerequisites: HY 101 and 102.</td>
<td></td>
</tr>
<tr>
<td>347</td>
<td>English History to 1660</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>A study of English history and society from Anglo-Saxon times to the Restoration with attention to the origins and evolution of governmental and legal institutions such as monarchy, common law, parliament, and the judiciary. Prerequisites: HY 101 and 102.</td>
<td></td>
</tr>
<tr>
<td>348</td>
<td>English History since 1660</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>A study of the impact of revolution, industrialization and war on English society, the expansion of English liberties, and the development of the cabinet, political parties, the empire and the welfare state. Prerequisites: HY 101 and 102.</td>
<td></td>
</tr>
<tr>
<td>364</td>
<td>The Westward Movement in American History since 1803</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Pioneering society, Indian relations, land policies, expansion, and politics of the Trans-Mississippi frontier.</td>
<td></td>
</tr>
<tr>
<td>365</td>
<td>American Economic and Labor History</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>A study of American labor relations and economic history from colonial times but concentrating on post-Civil War topics. Emphasis will be given to changes in macro-economic policy, management, and the organization of work.</td>
<td></td>
</tr>
<tr>
<td>366</td>
<td>Blacks in Twentieth Century America</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>The interrelationship of the African-America and the industrial-urban environment of the United States.</td>
<td></td>
</tr>
<tr>
<td>369</td>
<td>Social and Cultural History of the United States to 1865</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Major themes in the development of American culture and society from the colonial period to the Civil War era.</td>
<td></td>
</tr>
<tr>
<td>370</td>
<td>Social and Cultural History of the United States since 1865</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Major themes in the modernization of American culture and society since the Civil War.</td>
<td></td>
</tr>
<tr>
<td>373</td>
<td>Foreign Relations of the United States to 1900</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>American foreign relations from the Revolutionary era to the emergence of the United States as a world power. American territorial and commercial expansion and relations with the European powers.</td>
<td></td>
</tr>
<tr>
<td>374</td>
<td>Foreign Relations of the United States since 1900</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>The United States as a world power. American involvement in both World Wars, the development of the Cold War, and the growth of American presence in Asia and Latin America.</td>
<td></td>
</tr>
<tr>
<td>375</td>
<td>Imperial Russia</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>The formation and development of the Russian Empire from the reign of Peter the Great until the Revolution of 1905. The multinational character of the Empire and its manifestation in political, economic, and cultural aspects of Russian life. Prerequisites: HY 101 and 102.</td>
<td></td>
</tr>
<tr>
<td>376</td>
<td>Twentieth-Century Russia</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>The last years of Imperial rule, the constitutional experiment, World War I and the resulting revolutions of 1917, the rise and development of the Soviet Union from its inception until the present. Prerequisites: HY 101 and 102.</td>
<td></td>
</tr>
</tbody>
</table>
391 Europe, 1500-1815 3 hrs.
An examination of the economic, scientific, social, political, and cultural developments in Europe from the Renaissance to the close of the Napoleonic Wars.

392 Europe Since 1815 3 hrs.
A study of Europe from the end of the Napoleonic Wars to the present with equal emphasis on the nineteenth and twentieth centuries.

Courses listed below are open to students who have completed 15 semester hours in history or 12 semester hours in history with senior standing.

413 The Old South 3 hrs.
A study of southern society, economics, politics and culture concentrating on the nineteenth century South through Reconstruction.

414 The New South 3 hrs.
A study of the post-Reconstruction South emphasizing the economic, social, and political readjustments made during the twentieth century.

424 The Atlantic World 3 hrs.
A survey in a comparative framework of the West European colonial empires from 1500 to 1763. Emphasis on the cultural interaction of African, Amerindian and European peoples. Character of slavery and the plantation colonies, the impact of the old world on the new, the maturation of the old colonial systems.

426 Colonial America 3 hrs.
A study of the development of political, religious, and economic institutions in the United States, 1607-1763.

427 The Age of the American Revolution 3 hrs.
A study of political, economic, military, social, and cultural developments in the revolutionary period of American history, 1763-1789.

428 The Early American Republic 3 hrs.
A study of political, social, and economic changes in the United States and its sections from the adoption of the Constitution to the Compromise of 1850.

437 The Transformation of the American Republic 3 hrs.
A study of the nationalization and modernization of the United States from the period of the Civil War through the Populist movement.

438 Modern America 3 hrs.
A study of American society focusing on social and cultural change, reform, imperialism, and economic trends from the depression of the 1890s to the outbreak of World War II.

439 Recent American History 3 hrs.
A study of contemporary America from World War II to the present, analyzing both domestic and foreign affairs.

473 The High Middle Ages 3 hrs.
A study of the political, economic, and cultural features of Europe when medieval civilization was at its height.

474 The Renaissance and Reformation 3 hrs.
A study of Europe during the Renaissance and Reformation with emphasis upon political, social, economic, and cultural developments.

475 The Age of Absolutism 3 hrs.
A study of Europe from the Edict of Nantes to the Peace of Utrecht with emphasis on political, cultural, and scientific change.

476 The Ancien Régime and the Enlightenment 3 hrs.
A study of European intellectual and social movements from the Peace of Utrecht to the outbreak of the French Revolution.

231
Graduate Program

Degree: Master of Arts in History

The M.A. program in History, like the department’s undergraduate program, rests solidly upon the American and European fields of study, with more intensive focus in graduate studies upon historiography, research methods, and the writing of history. Course offerings are balanced between European and American history. Most thesis subjects are selected from topics in United States history or regional history, reflecting the strength of library holdings. The program serves teachers in the area’s secondary schools, adults seeking personal enrichment or career advancement, and students who will pursue doctoral-level studies elsewhere. Career opportunities may be enhanced in all fields with familiarization courses in statistics and computer sciences. Students are encouraged to consult with their graduate advisors regarding the benefits of these ancillary skills.

Admission Requirements

Applicants for graduate study in history must present a satisfactory undergraduate scholastic record and satisfactory GRE scores in both the aptitude and advanced portions of the examination. Reading ability in French, German, Latin, Russian, or Spanish is required. Admission may be granted without this requirement, but students must demonstrate reading proficiency in one of the above languages before completing 15 hours of graduate course work. Proficiency will be determined by the Department of History in cooperation with the Department of Foreign Languages and Literatures. Students may also make arrangements through the Department Chair to take a standardized (ETS) foreign language test which is administered at the University.

Each applicant must: (a) have a minimum overall undergraduate GPA of at least 3.0 (A = 4.0) or at least a 3.0 for the last 60 hours of work, (b) score at least 1500 on the three aptitude portions of the GRE, and (c) have an undergraduate major in History or its equivalent as determined by the departmental Graduate Committee.

Degree Requirements

The history graduate faculty offers courses in European and American history. In addition to the Graduate School requirements, the departmental requirements for the Master of Arts in History are:

1. Eighteen semester hours of graduate work in history, six of which may be transfer credit approved by the departmental Graduate Committee. Equal course distribution of U.S. and European history is expected.
2. Six additional hours of elective graduate courses in history or a related subject approved by the Graduate Committee.
3. At least 50 percent of the hours for a graduate degree (excluding thesis credit hours) in courses numbered 600 or above. At least nine hours must be in history courses numbered 600 or above (excluding thesis credit hours at UAH).

4. Master's thesis carrying a minimum of six hours. Upon petition to and approval by the departmental Graduate Committee, a student may substitute nine hours of graduate history courses for the thesis.

5. Oral comprehensive examination covering courses and thesis. Students must demonstrate competency in at least two fields of history. A student who does not write a thesis must take both oral and written examinations.

The requirements for the Master of Arts degree for those students seeking Class A certification are the same as above with the following exceptions:

1. Nine hours of graduate courses in education may be substituted for the elective graduate courses in history or a related subject.
2. An additional nine hours in history may be allowed in lieu of thesis.
3. The student must hold Class B certification.
4. A student who does not write a thesis must take both oral and written comprehensive examinations.
5. The Department of Education will coordinate and direct any supplementary requirements.

Non-Traditional Fifth-Year Program
Those who have a BA or BS degree with a major or its equivalent in history as determined by the Department of History, have not taken more than 12 semester hours in teacher education (graduate or undergraduate), and who are interested in obtaining Class A (master level) certification for secondary school teaching, should consider the Non-Traditional Fifth Year Program. Interested students should contact the Education Department for preliminary advisement on admission and general program requirements.

Upper Level Undergraduate Courses In History (HY)
If an applicant has insufficient undergraduate hours in history for even probational admission to the graduate program, but demonstrates to the departmental Graduate Committee sufficient potential and determination to merit further consideration, 6 to 12 course hours at the 400 level (senior undergraduate) may be required. Senior undergraduate course credit cannot be transferred or used for credit toward the Master of Arts in history.

Graduate Courses In History (HY)
The courses listed below are offered at the senior/graduate level. Undergraduate students registering for 500 level courses must be history majors who have completed 24 hours in history and have senior standing. See undergraduate program.

513 The Old South 3 hrs.
A study of southern society, economics, politics and culture concentrating on the nineteenth century South through Reconstruction.

514 The New South 3 hrs.
A study of the post-Reconstruction South emphasizing the economic, social, and political readjustments made during the twentieth century.

524 The Atlantic World 3 hrs.
A study of the Western European colonial empires in a comparative perspective from the 1450s to 1763.

526 Colonial America 3 hrs.
A study of the development of political, religious, and economic institutions in the United States, 1607-1763.
527 The Age of the American Revolution 3 hrs.
A study of political, economic, military, social, and cultural developments in the revolutionary period of American history, 1763-1789.

528 The Early American Republic 3 hrs.
A study of political, social, and economic changes in the United States and its sections from the adoption of the Constitution to the Compromise of 1850.

537 The Transformation of the American Republic 3 hrs.
A study of the nationalization and modernization of the United States from the period of the Civil War through the Populist movement.

538 Modern America 3 hrs.
A study of American society focusing on social and cultural change, reform, imperialism, and economic trends from the depression of the 1890s to the outbreak of World War II.

539 Recent American History 3 hrs.
A study of contemporary America from World War II to the present analyzing both domestic and foreign affairs.

573 The High Middle Ages 3 hrs.
A study of the political, economic, and cultural features of Europe when medieval civilization was at its height.

574 The Renaissance and Reformation 3 hrs.
A study of Europe during the Renaissance and Reformation with emphasis upon political, social, economic, and cultural developments.

575 The Age of Absolutism 3 hrs.
A study of Europe from the Edict of Nantes to the Peace of Utrecht with emphasis on political, cultural, and scientific change.

576 The Ancien Régime and the Enlightenment 3 hrs.
A study of European intellectual and social movements from the Peace of Utrecht to the outbreak of the French Revolution.

577 The French Revolution and Napoleon 3 hrs.
A study of European ideas, institutions, and events from the beginning of the French Revolution to the demise of the Napoleonic Empire.

578 Europe in the Nineteenth Century 3 hrs.
A study of major political, social, economic, and intellectual developments in Europe from the Congress of Vienna to World War I.

579 Europe in the Twentieth Century 3 hrs.
A study of major developments in Europe from 1914 to the present, including the two world wars and post-war reconstruction.

590 Research Seminar in History 3 hrs.
Historiography, research and writing, and recent interpretations in the field of history. Open only to seniors who are majoring or minoring in history or to graduate students.

Courses at the 600 level are open to graduate students or to senior history majors in accordance with specific Graduate School requirements.

605 Recent Interpretations of Modern History 3 hrs.
Development of the ability to appraise critical historical issues through study and discussion of recent interpretations of key historical problems in modern Western history. Prerequisite: Graduate standing or permission of instructor.

614 Studies in Southern History 3 hrs.
Research, writing, and critical examination of selected topics in nineteenth and twentieth century southern history.
Studies in Early American History 3 hrs.
Research, writing, and critical examination of selected topics in early American history from 1607 to 1800.

Research, writing, and critical examination of selected topics in nineteenth-century American history.

Research, writing, and critical examination of selected topics in twentieth-century American history.

Research Methods in History 3 hrs.
An exploration of contemporary research methods such as archival research, prosopography, paleography, quantitative methods, and state/local research techniques.

Studies in British History 3 hrs.
Research, writing, and critical examination of selected topics in British history.

Studies in French History 3 hrs.
Research, writing, and critical examination of selected topics in French history.

Studies in Russian and Soviet History 3 hrs.
Research, writing, and critical examination of selected topics on Imperial Russia and the Soviet Union.

Studies in Medieval History 3 hrs.
Research, writing, and critical examination of selected topics in medieval history.

Studies in Early Modern Europe 3 hrs.
Research, writing, and critical examination of selected topics in the field of early modern European history.

Studies in Modern Europe 3 hrs.
Research, writing, and critical examination of selected topics in the field of modern European history.

Master's Thesis 1-3 hrs.
A course required each term a student is working and receiving direction on a master's thesis. A minimum of two terms is required but no more than six hours credit is allowed for the thesis.

Music Department

Professors Boyer, Pales; Associate Professors Crabb, Graves (chair); Assistant Professor Contreras, Sanders, Adjunct Lecturer Weaver.

The Department of Music, which offers the B.A. in Music and in Music Education, has two principal curricular goals: to provide a quality major in music which prepares students who wish to become public or private teachers, church musicians, or who wish to pursue graduate studies in music. The major is also suitable for students who have not established specific professional aspirations, but who desire a liberal arts education.

The curriculum for music majors is designed to provide students with knowledge of our musical heritage and the great masterworks of music literature, a foundation in theoretical studies and musical skills sufficient to allow them to deal intelligently with music, and performance experiences which develop technical skill and artistic sensitivity. Additional offerings will provide music education students with knowledge of the appropriate materials, teaching strategies and organizational skills necessary to become successful public school teachers.

All the department's programs are strongly based in the liberal arts, in the belief that a broad general education is an appropriate preparation for both the well-rounded musician and the educated individual.

235
Courses for the General Student (Non-Music Majors)

The following courses and ensembles are open to all university students; many require little or no musical experience. Upper-level credit is available for some courses. Students may receive studio instruction (private lessons) in voice and in nearly every musical instrument.

MU 100 Fundamentals of Music
MU 110 Introduction to Music Listening
MU 111 Popular Music in America: Beginnings to 1950
MU 112 Popular Music in America: 1950 to the Present
MU 210 Music with the Maestro
MU 215 Music for the Young Child
MU 310 American Music
MU 410 Music in Western Civilization
MU 190/390 UAH Choir
MU 192/392 Huntsville Village Singers
MU 199/399 UAH Wind Ensemble
MU 290 Opera/Music Theatre Workshop
MU 296 Pep Band
MU 297 Jazz Ensemble

Music Major

The major in music, with emphasis in either performance, Church music, or music literature, is a degree program of 134 credit hours. To minimize degree hours, a music major should choose a minor from the disciplines represented in GER. Students with dual interests and abilities will find many opportunities for combining the music major with other disciplines.

Music Education Major

The major in music education is a 151 credit hour degree program built upon a broad liberal arts base. The course of study integrates music and professional education courses to develop a superior music teacher, certified to teach at all levels N-12 (Class B Professional Teacher's Certificate) with strength in either vocal or instrumental music. Students must demonstrate throughout their course of study competencies in both performance and teaching. Because of the demands of this program, there is little opportunity to elect courses other than those required and outlined below. With additional study of the principal instrument and a senior recital performance, music education students are eligible to receive a special performance certificate. Faculty approval is required.

Bachelor of Arts in Music and Music Education

Students wishing to pursue a music major should have pre-college training in their principal performing instrument or voice and have ability to read music fluently. Basic keyboard ability is helpful but not mandatory.

Entering freshmen and transferring students are required to take a placement examination in rudiments (scales, keys, intervals, triads, general notation), music reading and performance (principal instrument or voice). Deficiencies may be removed through remedial instruction.

I. General Education Requirement 66-72 hrs.

GER for the B.A. degree are listed in the academic information section. The student should include MU 110 to fulfill the Fine Arts option. Music education students must include ED
230, ED 263, ED 510 and at least one course in economics for the social science requirement; other music majors should choose at least one course in philosophy. Music education students must also include three hours of HPE courses (including either CPR or Nutrition), and should fulfill the upper division Humanities/Fine Arts requirement with MU 312.

II. Major (select A or B)

A. Music

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MU 1-1/4-3 Principal Instrument*</td>
<td>12</td>
</tr>
<tr>
<td>MU 1-0/2-0 Secondary Instrument**</td>
<td>3</td>
</tr>
<tr>
<td>MU 101, 102, 301, 302, 303 Theory-Harmony</td>
<td>10</td>
</tr>
<tr>
<td>MU 103, 104, 304, 305, 306 Musicianship Skills</td>
<td>5</td>
</tr>
<tr>
<td>MU 110 Introduction to Music Listening (include in GER)</td>
<td>3</td>
</tr>
<tr>
<td>MU 311, 312 Music History</td>
<td>6</td>
</tr>
<tr>
<td>MU 325 Conducting</td>
<td>2</td>
</tr>
<tr>
<td>Ensembles***</td>
<td>6</td>
</tr>
<tr>
<td>Junior recital</td>
<td>0</td>
</tr>
<tr>
<td>Senior recital</td>
<td>0</td>
</tr>
</tbody>
</table>

**Minor**

Selected minor from a discipline represented in the GER.

B. Music Education Emphasis

(Composite Major-Minor)

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MU 1-0/4-0 Principal Instrument (10 terms; 4 hours upper level)</td>
<td>10</td>
</tr>
<tr>
<td>Junior recital (solo and ensemble works)</td>
<td>0</td>
</tr>
<tr>
<td>Secondary instrument(s): (6 terms)</td>
<td>3-6</td>
</tr>
<tr>
<td>Voice principals elect piano, MU 130-230</td>
<td></td>
</tr>
<tr>
<td>Piano principals elect voice, MU 140-240</td>
<td></td>
</tr>
<tr>
<td>Instrument principals elect the following courses:</td>
<td></td>
</tr>
<tr>
<td>Percussion, MU 184</td>
<td></td>
</tr>
<tr>
<td>Strings, MU 154, 254</td>
<td></td>
</tr>
<tr>
<td>Woodwinds, MU 164, 264</td>
<td></td>
</tr>
<tr>
<td>Brasses, MU 174, 274 (one course to be deleted in principal instrument area)</td>
<td></td>
</tr>
<tr>
<td>Ensembles***</td>
<td>7-10</td>
</tr>
</tbody>
</table>

**Music Performance, Theory, and Literature**

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MU 101, 102, 301, 302, 303 Theory-Harmony</td>
<td>10</td>
</tr>
<tr>
<td>MU 103, 104, 304, 305, 306 Musicianship Skills</td>
<td>5</td>
</tr>
<tr>
<td>MU 110 Introduction to Music Listening (GER)</td>
<td>3</td>
</tr>
<tr>
<td>MU 311, 312 Music History (include 312 in GER)</td>
<td>6</td>
</tr>
<tr>
<td>MU 416 Orchestration</td>
<td>2</td>
</tr>
<tr>
<td>MU 325 Conducting</td>
<td>2</td>
</tr>
<tr>
<td>MU 425 Advanced Conducting</td>
<td>2</td>
</tr>
</tbody>
</table>

**Music Education**

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUE 225 Introduction to Music Education</td>
<td>1</td>
</tr>
<tr>
<td>MUE 326 Teaching General Music in Elementary Schools</td>
<td>3</td>
</tr>
<tr>
<td>MUE 327 Teaching General Music in Secondary Schools</td>
<td>3</td>
</tr>
</tbody>
</table>
MUE 428 Organizing and Directing Vocal Groups in Secondary Schools
or
MUE 429 Organizing and Directing Instrumental Groups in Secondary Schools

Professional Education
ED 230 Human Development (GER) .................................................. 3
ED 261 Foundations of Education in U.S. ........................................... 3
ED 263 Educational Psychology (GER) ............................................... 3
ED 408 Teaching Reading in the Secondary School ........................... 3
ED 490 Principles of High School Teaching ..................................... 3
ED 499 N-12 Internship** ............................................................... 9
ED 510 Foundations of Educational Evaluation (GER) ....................... 3
ED 593 Education of Exceptional Children and Youth ..................... 3

*Students electing the music literature or Church music emphasis will be limited to 8 hours rather than 12 hours of studio instruction. Four hours of appropriate upper-level music literature and history courses replace studio work. For the Church music emphasis, this four hours will include MU 415, MUE 428, and MU 412. MU 315 replaces MU 311 in the Church music program. Other special projects replace junior and senior recitals.

**All or part of the secondary requirement may be satisfied by examination. In the Church music emphasis, some organ study may be substituted for piano.

***Students must complete a minimum of twelve terms of small or large ensemble experiences; however, a maximum of 6 hours may count towards the degree (10 in the music education emphasis).

****Students must pass a piano competency examination before internship. ED 490 must be taken concurrently with internship.

Music Minor

Students may select music as a supportive minor to their major discipline. A selection of combinations with majors in other disciplines is on file in the Music Department, or students may formulate their own with approval of representative faculty advisors from departments involved. Generally twenty-four hours of music are necessary (12 hours upper-level), including the following courses:

MU 1-0/2-0 Studio Instruction ......................................................... 3
MU 101, 102, 301 Theory-Harmony ................................................. 6
MU 103, 104, 304 Musicianship Skills ............................................. 3
MU 110 Introduction to Music Listening (include in GER) .................. 3
MU 310 History of Music II ............................................................ 3
Ensemble (300 level) .................................................................... 6

Music for Second Area of Study

Students majoring in elementary education may select music as their second area of study. See major requirements in Education section. 24 hours in music are required:

MU 101, 102, 301 Theory of Music ...............................................  6
MU 103, 104, 304 Musicianship Skills ............................................  3
MU 110 Introduction to Music Listening ........................................  3
MU 310 American Music ...............................................................  3
MU 312 Music History II ................................................................. 3
MUE 326 Teaching General Music in Elementary School .................. 3
(Replacement for MUE 215 in the GER)
Ensembles (at 300 level) ................................................................ 3

Music (MU)

100 Fundamentals of Music ......................................................... 3 hrs.
Basic music presented in a practical way for students who have little or no musical
training. Mechanical aspects of music—clefs, notation, scales, intervals, and rhythm
with some aural skills, and practice in writing and harmonizing melodies. For stu-
dents who expect to major or minor in music, this course may not be taken for degree
credit.

101 Theory of Music I ................................................................. 2 hrs.
Fundamentals of basic musicianship through practical as well as theoretical studies.
Development of skills in written harmony and analysis. Appropriate Musicianship
skills (e.g. MU 103) to be taken concurrently throughout theory program. Prerequi-
site: approval of instructor or Department Chair.

102 Theory of Music II ............................................................... 2 hrs.
Continuation of MU 101. Prerequisites: MU 101 and 103.

103 Musicianship Skills I ............................................................ 1 hr.
To be taken concurrently with MU 101 and designed to complement written studies.
Exercises in sight singing using solfege, numbers, or other systems. Basic conduct-
ing patterns, rhythmic execution and melodic, harmonic, and rhythmic dictation.
Prerequisite: approval of instructor or Department Chair.

104 Musicianship Skills II ............................................................ 1 hr.
Continuation of MU 103. Prerequisites: MU 101 and 103.

106 Introduction to Computers in Music ..................................... 1 hr.
An introduction to the utilization of computers in music, including the fundamen-
tals of sound synthesis. Emphasis on practical applications of hardware and software
in the study of music and skills development. One class period and one lab weekly.

110 Introduction to Music Listening .......................................... 3 hrs.
Basic course in music appreciation. Exploration of ideas and issues in various types
of Western music through reading, listening and discussion.

111 Popular Music in America: Beginnings to 1950 .................... 3 hrs.
Basic appreciation course. Folk and Jazz (including Blues, Ragtime, and Dixieland)
in the last century. Related socio-economic, demographic, and technological factors.

112 Popular Music in America: 1950 to the Present ..................... 3 hrs.
Basic appreciation course. History of Rock and Roll, with some time devoted to folk
music and jazz of the period. Related socio-economic, demographic, and technologi-
cal factors, with extra emphasis on the decade of the 1960's.

210 Music with the Maestro ......................................................... 3 hrs.
Survey of music masterpieces, (e.g. Beethoven 5th Symphony, Stravinsky “Firebird
Suite,” works of J.S. Bach). Focus on live experiences with music and musicians.
Classes with live performances, records, films, and informal discussion with musici-
cians. Offered only on demand.

301 Theory of Music III ............................................................. 2 hrs.
Continuation of studies on a more advanced basis than MU 101-102. Prerequisites:
MU 102 and 104.
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>302</td>
<td>Theory of Music IV</td>
<td>2 hrs.</td>
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<tr>
<td></td>
<td>Continuation of MU 301. Prerequisites: MU 301 and 304.</td>
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<tr>
<td>303</td>
<td>Theory of Music V</td>
<td>2 hrs.</td>
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<tr>
<td></td>
<td>Continuation of MU 302, with emphasis on twentieth century materials. Prerequisites: MU 302 and 305.</td>
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<tr>
<td>304</td>
<td>Musicianship Skills III</td>
<td>1 hr.</td>
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<tr>
<td></td>
<td>Continuation of MU 104. Prerequisites: MU 102 and 104.</td>
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</tr>
<tr>
<td>305</td>
<td>Musicianship Skills IV</td>
<td>1 hr.</td>
</tr>
<tr>
<td></td>
<td>Continuation of MU 304. Prerequisites: MU 301 and 304.</td>
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<tr>
<td>306</td>
<td>Musicianship Skills V</td>
<td>1 hr.</td>
</tr>
<tr>
<td></td>
<td>Continuation of MU 305. Prerequisites: MU 301 and 305.</td>
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<tr>
<td>309</td>
<td>Analysis of Musical Form</td>
<td>2 hrs.</td>
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<td></td>
<td>Analysis of representative small and large compositions of the sixteenth through the twentieth centuries for structure and form. Prerequisites: MU 110 and 303 or approval of instructor.</td>
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<tr>
<td>310</td>
<td>American Music</td>
<td>3 hrs.</td>
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<td>A course designed for the non-music major. Important aspects of American musical art are presented, including the Colonial period, folksong and European influences, jazz, Broadway and film scores. The contemporary period, beginning with Charles Ives, is also covered.</td>
<td></td>
</tr>
<tr>
<td>311</td>
<td>History of Music I</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Development of music as an art in Western Civilization to 1750. Representative musical works and style. Understanding of musical concepts in view of their historical background. Prerequisite: MU 110 and 301, or approval of instructor.</td>
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</tr>
<tr>
<td>312</td>
<td>History of Music II</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Music as an art in Western Civilization from 1750 to the present. Formal and stylistic problems through representative works and an understanding of musical concepts in light of their historical and general cultural context. Prerequisites: MU 110 and 301, or approval of the instructor.</td>
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</tr>
<tr>
<td>313</td>
<td>Survey of a Musical Form</td>
<td>3 hrs.</td>
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<td></td>
<td>A musical form (e.g., concerto, opera, etc.) from its origins to present time. Variable topics. Prerequisites: MU 303 and 311 or 312.</td>
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</tr>
<tr>
<td>314</td>
<td>Biographical Survey</td>
<td>3 hrs.</td>
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<td></td>
<td>Life and work of great composers. Variable topics. Prerequisites: MU 303 and 311 or 312.</td>
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<tr>
<td>315</td>
<td>History of Music in Liturgy</td>
<td>3 hrs.</td>
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<td></td>
<td>Beginning with pagan, Eastern and Hebraic sources, music in liturgical worship is traced to the present. Choral and organ music is studied for its practical usage and artistic value. Special attention is given to monumental works from the Medieval, Renaissance, Baroque, Classical, Romantic and Contemporary periods. Prerequisites: Junior standing, MU 110 and 301.</td>
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</tr>
<tr>
<td>320</td>
<td>Piano Pedagogy</td>
<td>2 hrs.</td>
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<tr>
<td></td>
<td>Materials, techniques, and practices in teaching beginners and students through lower advanced grades of piano. Practical experience. Prerequisite: approval of instructor. Offered upon demand.</td>
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</tr>
<tr>
<td>321</td>
<td>Piano Technology</td>
<td>1 hr.</td>
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<td></td>
<td>Development of keyboard instruments, use of equal-temperament tuning, and minor piano action regulation and repair. Prerequisite: Ability to read music and familiarity with keyboard. Offered upon demand.</td>
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</tr>
<tr>
<td>325</td>
<td>Conducting</td>
<td>2 hrs.</td>
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<tr>
<td></td>
<td>Basic techniques of choral and instrumental conducting. Prerequisites: MU 301 or approval of instructor.</td>
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</tr>
</tbody>
</table>
Twentieth Century Materials and Techniques 3 hrs.
Systems of tonal organizations, compositional procedures, terminology, and analytical methods that relate to music of our century. Prerequisites: MU 303 and 312 or approval of instructor.

Music in Western Civilization 3 hrs.
Major musical masterpieces and personalities are studied, with some emphasis on the effects of social, economic and political events on the evolution of musical style, form and performance media. Visual and literary arts are referenced and included in the readings, study and discussion. Prerequisites: MU 110, Junior standing or permission of instructor.

Musicum Practicum 1 hr.
Courses of study and activity developed by the student and submitted to music faculty for approval. Projects to reinforce learning and performance experiences. May be repeated, but no more than two hours count toward degree requirements.

Church Music Practicum 0 hr.
Forty hours working with selected professional church musicians in the community. An internship providing hands-on experiences in real church situations. Supervised by music faculty. Prerequisites: senior standing, MU 315 and MU 415. Lab fee: Level 7.

Church Music Methods 2 hrs.
A practical approach preparing the church musician in choral and organ methods, liturgical planning, pastoral relations, and professional standards and goals. Prerequisites: MU 303 and MUE 326.

Orchestration 2 hrs.
Instruments of the band and orchestra, their ranges, transpositions, and capabilities. Practical experience in arranging for instruments. Prerequisite: MU 303.

Piano Literature 2 hrs.
Music for string keyboard instruments from the pre-pianoforte period to the present. Representative works from all periods. Prerequisites: MU 303, 306, 312 or approval of instructor.

Advanced Conducting 2 hrs.
Review of basic conducting patterns. Emphasis on Communication as the role of the conductor. Detailed score preparation. Prerequisite: MU 325.

Concert Band Literature and Conducting Critique 3 hrs.
Literature for concert band and wind ensemble. Variety of music (type, style, and difficulty) as well as in-depth study of a few scores by each student for critiques of rehearsal and conducting techniques. UAH Summer Band serving as reading and laboratory ensemble. Prerequisite: MU 425; or approval of instructor.

Master Class in Piano Literature and Pedagogy 2 hrs.
Topic of course varies: Examination of selected forms.

Studio Instruction In Vocal and Instrumental Music
Students must fill out a "Request for Studio Instruction" card in the Music Department prior to each term they are enrolled. Transfer students who plan to take studio instruction for music credit must demonstrate their level of proficiency to the instructor before registration. Instruction varies from 30 to 50 minutes weekly.

Generally, students not intending to major in music should enroll in MU 130, 140, 150, 160 or 170, however, advanced students may enroll in MU 131, 141, etc., with permission of the instructor. A special studio instruction fee is charged (see Fees).

To advance to the next 100 level of studio instruction (i.e. from 133 to 231 or 130 to 230), each student must perform before a faculty jury. The jury may retain students at any level until
proper achievement is reached for advancement or completion of degree performance competencies. The instructor's grade may be raised or lowered one letter to reflect jury performance. Non-majors may enroll in studio instruction as long as the instructor agrees that satisfactory progress is made; no jury is necessary.

Students taking studio instruction must attend performances, the monthly student recital program and special performance classes. A student may be excused only with written permission of the department chair. As a part of studio instruction, students enrolled as full-time music majors must attend at least six approved concerts a term; other enrolled students must attend three. Prerequisites for each studio course include approval of the instructor and (for 200, 300, and 400 level courses) the previous 100 level of instruction.

**Numbering System.** Courses which have numbers ending in 1, 2, or 3 are generally for music majors' principal instrument, although other advanced students may enroll for these courses through departmental audition. Courses ending in 0 are for non-majors, minors and music majors' secondary instrument.

130, 230, 330, 430

*Studio Instruction in Keyboard (piano and organ).*

Studio instruction fee: Level 7.

131, 132, 133, 231, 232, 233, 331, 332, 333, 431, 432, 433

*Studio Instruction in Keyboard (piano and organ).*

Studio instruction fee: Level 9.

140, 240, 340, 440

*Studio Instruction in Voice.*

Studio instruction fee: Level 7.

141, 142, 143, 241, 242, 243, 341, 342, 343, 441, 442, 443

*Studio Instruction in Voice*

Studio instruction fee: Level 9.

150, 250, 350, 450

*Studio Instruction in Strings (orchestral strings and guitar).*

Studio instruction fee: Level 7.

151, 152, 153, 251, 252, 253, 351, 352, 353, 451, 452, 453

*Studio Instruction in Strings*

Studio instruction fee: Level 9.

154, 254

*Class Instruction in Strings*

For secondary instruments, instrumental music education majors.

Studio instruction fee: Level 7.

160, 260, 360, 460

*Studio Instruction in Woodwinds*

Studio instruction fee: Level 7.

161, 162, 163, 261, 262, 263, 361, 362, 363, 461, 462, 463

*Studio Instruction in Woodwinds*

Studio instruction fee: Level 9.

164, 264

*Class Instruction in Woodwinds*

For secondary instrument, instrumental music education students.

Studio instruction fee: Level 7.

170, 270, 370, 470

*Studio Instruction in Brass*

Studio instruction fee: Level 7.
Studio Instruction in Brass
Studio instruction fee: Level 9.

Studio Instruction in Brass
For secondary instrument, instrumental music education students.
Studio instruction fee: Level 7.

Studio Instruction in Percussion
Studio instruction fee: Level 7.

Studio Instruction in Percussion
Studio instruction fee: Level 9.

Class Instruction in Percussion
For secondary instrument, instrumental music education students.
Studio instruction fee: Level 7.

Ensembles
The UAH music ensembles are open to all students; some ensembles require an audition. Ensemble participation is essential for all music majors and minors, and an appropriate ensemble must be selected each term a student is enrolled for degree requirements. A maximum of 6 semester hours in ensemble courses (MU 190-199, 290-299, 390-399) may be applied as credit toward total degree requirements in any discipline except Music Education, where the maximum is 10 hours. Students may continue to enroll, however, and repeatedly participate in ensembles throughout their university career. Only students who have held membership in an ensemble for six terms should enroll in 300 level instruction. Through audition students may receive upper-level credit after three terms of membership.

190, 390 UAH Choir
Mixed voices singing the serious choral repertoire. Open to all students by audition. Required attendance at rehearsals and performances.

193 Summer Chorus
Mixed voices singing a variety of choral music.

195 Music for A While Ensemble
Solo-ensemble performance specializing in early and contemporary music.

196, 396 Chamber Ensembles
Discussion, evaluation and performance of literature available for selected small ensembles. Piano trios, quartets, quintets, string quartets, woodwind, brass, percussion and vocal ensembles. Prerequisite: Approval of instructor.

197 Summer Band
Rehearsal and performance of a variety of music for concert band. By audition with the conductor.

198, 398 Huntsville Symphony Orchestra
An orchestra of seventy-five players with international guest artists. Performance of major symphonic, operatic, and choral literature. By audition with the conductor. Required attendance at rehearsals and performances.

199, 399 UAH Wind Ensemble
Preparation of the finest literature for wind ensemble and concert band. Open to all students by audition with the conductor. Required attendance at rehearsals and performances.
290 Opera/Music Theatre Workshop  
1 hr.  
Instruction in stage movement and mannerisms, character and vocal coaching leading to performances of scene excerpts. Prerequisites: Audition with the conductor. Required attendance at rehearsals and performances.

297 UAH Jazz Ensemble  
1 hr.  
Open to all students with the permission of the director. This group provides the participant with opportunities to perform a wide variety of jazz styles in varied settings. Individual instruction in arranging and composition available. Required attendance at rehearsals and performances.

298 UAH Pep Band  
1 hr.  
Open to all students with the permission of the director. This group provides appropriate music for selected UAH athletic events. Winter term only. Required attendance at rehearsals and performances.

Music Education (MUE)

215 Music for the Young Child  
3 hrs.  
A course for elementary and special education teachers, recreational therapists, church school, or prospective teachers not trained in music. Preparation to teach children ages 3-12 through experience in singing, reading, planning, and presentation. Elementary education majors using music as their second area of study must select MUE 326 rather than MUE 215 for their GER.

225 Introduction to Music Education  
1 hr.  
Philosophical orientation to music teaching. Observation and mini-teaching experiences with follow-up discussions. Prerequisites: MU301, 110 or approval of instructor.

326 Teaching General Music in Elementary Schools  
3 hrs.  
Materials and methods. Emphasis on developing teaching competencies. Prerequisites: MU 303, MUE 225 or permission of instructor.

27 Teaching General Music in Secondary Schools  
3 hrs.  
Materials and Methods. Emphasis on developing teaching competencies. Prerequisites: MU 303, MUE 225 or permission of instructor.

428 Organizing and Directing Vocal Groups in Secondary Schools  
2 hrs.  
Repertoire, procedures for administering and teaching school glee clubs, choirs, and vocal ensembles. Prerequisites: MUE 326, 327, MU 425 or permission of instructor.

429 Organizing and Directing Instrumental Groups in Secondary School  
2 hrs.  
Repertoire, procedures for administering and teaching school bands, orchestras and instrumental ensembles. Prerequisites: MUE 326, 327, 425 or permission of instructor.

520 Arts in the Elementary School Curriculum  
3 hrs.  
An interdisciplinary approach to teaching the arts in elementary school, including music, movement, theatre, and the visual arts. Practical experiences in playing instruments (percussion), moving, drawing, creating, singing, working in clay, play-acting and pantomime. Methodology for integrating the arts through active participation.

521 Philosophical Principles of Music Education  
3 hr.  
Philosophical base of music education, its justification in the public school curriculum, and criteria for determining its objectives. Application of aesthetic theory to analysis and evaluation of music.
Philosophy Program
Associate Professor Martine; Assistant Professors Cling, Elbert, Lang; Lecturer Green.

The world of ordinary experience is founded upon a great number of presuppositions about the nature and extent of knowledge, the character of reality, and the foundations of value which are seldom exposed to critical reflection. These interconnected presuppositions form the basis for our judgments and actions in every area of human concern. The essential task of philosophy is to move beyond an uncritical acceptance of these presuppositions toward a reflective appraisal of the effect they have upon our understanding of ourselves and the world around us. By examining the ideas of the western philosophical tradition and the positions of the influential contemporary thinkers, courses in the philosophy program offer students the opportunity to develop informed and responsible positions of their own.

Philosophy Minor
Students interested in a philosophy minor must take at least 21 semester hours in philosophy including PHL 201 and PHL 202. Recommendations concerning which courses might best complement a student’s major and related interests are available from the philosophy faculty upon request. Appropriate philosophy courses may also be used as part of a program of cognate studies with other disciplines. Such a program must include at least 9 semester hours in courses numbered 300 or above.

Philosophy (PHL)
101 Introduction to Philosophy 3 hrs.
An introduction to philosophical reflection focusing upon central problems in each of the major branches of the western tradition: metaphysics, epistemology and axiology.

201 Introduction to Logic 3 hrs.
Methodology of correct reasoning as applied to both formal and informal contexts.

202 Introduction to Ethics 3 hrs.
Major ethical positions in both classical and modern thought.

204 Comparative Religions: Judaism, Christianity, Islam 3 hrs.
An analytical and comparative study of three of the world’s major religions: Judaism, Christianity, Islam. The origins, developments, traditions, and beliefs of these religions are compared and contrasted.

301 Ancient Philosophy 3 hrs.
Survey of classical philosophy from the Pre-Socratics through Aristotle. Prerequisite: PHL 101 or permission of the instructor.

302 Modern Philosophy 3 hrs.
Survey of the British and Continental traditions from Descartes through Kant. Prerequisite: PHL 101 or permission of the instructor.

303 Contemporary Philosophy 3 hrs.
Examination of some of the most important trends in late nineteenth and twentieth century thought. Prerequisite: PHL 101 or permission of the instructor.

310 Philosophy of Art 3 hrs.
Major aesthetic theories of the western tradition, with emphasis on the relation between artistic and discursive expression. Prerequisite: PHL 101 or permission of the instructor.

311 Philosophy of Science 3 hrs.
Critical assessment of the historical and logical foundations of the natural and theoretical sciences. Prerequisite: PHL 101 or permission of the instructor.
312 American Philosophy 3 hrs.
Survey of American thought with emphasis upon the development of pragmatism in the work of Peirce, James, and Dewey. Prerequisite: PHL 101 or permission of the instructor.

316 Classical Political Philosophy 3 hrs.
A careful analysis of the roots of political inquiry in selected works of ancient and medieval political philosophers such as Socrates, Plato, Aristotle, Cicero, Augustine and Aquinas. Major themes include the search for the just social order, the proper relationship between the citizen and the state, and other fundamental concepts of Western political institutions. (Same as PSC 316).

317 Modern Political Philosophy 3 hrs.
A critical examination of the philosophical foundations for modern politics that emerged from the 15th through the 19th century in Western Europe. Major themes and theorists include the concepts of individual rights, property, representation, majority rule, limited government, and revolution discussed in selected writings of Machiavelli, Hobbes, Locke, Rousseau, and J.S. Mill among others. (Same as PSC 317).

320 Symbolic Logic 3 hrs.
Symbolic deductive logic, including propositional calculus (truth-functional logic), predicate calculus (propositional functions and quantification), and the logic of relations. Prerequisite: PHL 201.

321 Ethics and the Professional 3 hrs.
Investigation of fundamental problems of conduct as they appear in medicine, law, and business. Prerequisite: PHL 101, PHL 202, or permission of the instructor.

385 Selected Topics in the History of Philosophy 3 hrs.
Intensive examination of particular problems, periods, or movements in the history of philosophy. Prerequisite: Determination in accordance with course content.

401 Metaphysics 3 hrs.
Critical examination of traditional and contemporary responses to questions surrounding the nature of reality, the relation between determinate and indeterminate being, being and becoming, the infinite and the finite. Prerequisite: 6 hours of PHL not including PHL 201.

402 Epistemology 3 hrs.
Investigation of fundamental problems of knowledge such as the relation of knowledge and belief, truth, certainty and skepticism, perception, logic, explanation, and justification. Prerequisite: 6 hours of PHL not including PHL 201.

Political Science Department

Professors Meek, Spitz (chair); Associate Professors MacDougall, Pottenger, Williams; Assistant Professor Gitz; Lecturer Crothers; Adjunct Assistant Professors Burke, Moorman, Schumann, Slaughter.

The Department of Political Science offers the Bachelor of Arts in political science and the Master of Arts in Public Affairs.

General Education Requirements

PSC 101 — American Government and/or PSC 135 — Introduction to Comparative Government are the two courses to be used to fulfill General Education Requirements (GER) for non-majors. Political Science majors must include AH 300 - Statistical Analysis in their GER.
Undergraduate Program

Political Science Major

A student who wishes to major in political science must include in his academic program a minimum of 36 semester hours in political science, including PSC 101, 135, 246, 311 and either 316 or 317 (15 hours). In addition, majors are required to take a minimum of three (3) hours from each of four fields of political science:

1. International Relations and Comparative Government (PSC 336, 337, 338, 339, 343, 465 and 467);
2. Law and Theory (PSC 271, 318, 371, 419, 471);
3. Sub-National Politics and Administration (PSC 221, 223, 323, 350, 423, and 450);

The remaining nine (9) hours may be taken as electives from the above courses or other political science courses. A minimum of 15 semester hours must be in political science courses numbered 300 or above.

A student with a major in political science must choose a minor from another discipline; or, instead of a minor, the student has the option of choosing 21 hours of cognate studies, a group of courses drawn from two or more disciplines of which 12 hours must be in upper-level course work; a minimum of 6 hrs. must be in each discipline.

Freshmen considering a major in political science should consult with a faculty advisor in the department during their freshman year. Sophomores must file a program of study before the end of their sophomore year. Transfer students are advised to consult with a faculty member in the department before scheduling courses.

Guidelines for curriculum planning in political science are available in the department office. These guidelines are designed to consider such intellectual and vocational interests as prelaw training, international studies, public service, and graduate school preparation.

Political Science Minor

The student with a minor in political science must take 21 hours of course work including PSC 101, 135 and 246, and at least 6 hours of course work 300 or above.

Political Science for Second Area of Study

Students majoring in elementary education may select political science as their second area of study. Major requirements can be found in the Education section. Students seeking certification in secondary education should seek advisement from the Education Department where a program of study leading to endorsements in political science and/or the social sciences can be developed.

Internship Programs

The Department of Political Science has an internship program for students in political science, public affairs and prelaw. Internships bridge the gap between learning experience and entry into professional life. Interested juniors and seniors should apply to the Department of Political Science.

Political Science (PSC)

101 American Government 3 hrs.

135 Introduction to Comparative Government 3 hrs.
Surveys the political cultures, governmental structures, and contemporary policy problems of parliamentary, communist and third world political systems. PSC 101 required.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>182</td>
<td>Issues in U.S. and World Politics</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Outstanding problems confronting America and/or world political systems. (For students who are not majors or minors in Political Science.)</td>
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<tr>
<td>221</td>
<td>State and Local Government</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Introduction to state and local politics in America. Different governmental forms and their impact on public policies. PSC 101 recommended.</td>
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<tr>
<td>223</td>
<td>Alabama and Southern Politics</td>
<td>3 hrs.</td>
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<td></td>
<td>Surveys the government and politics of Alabama and provides an overview of the political culture in the American South. PSC 101 recommended.</td>
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</tr>
<tr>
<td>246</td>
<td>Introduction to International Relations</td>
<td>3 hrs.</td>
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<td></td>
<td>Examinations of the basic factors underlying the conduct of international relations focusing upon the forces affecting the change and direction of the present state system. Special attention is given to the forces affecting war and peace. PSC 135 recommended.</td>
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</tr>
<tr>
<td>271</td>
<td>Introduction to American Legal Systems</td>
<td>3 hrs.</td>
</tr>
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<td></td>
<td>Structure, jurisdiction, procedures, and impact of the courts in administration of justice. Focus on the roles of the major participants in the legal system. Both criminal and civil justice topics are covered. PSC 101 recommended.</td>
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</tr>
<tr>
<td>280</td>
<td>Special Topics in Political Science</td>
<td>1-3 hrs.</td>
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<tr>
<td></td>
<td>Study of selected topics in local, state, national and world politics.</td>
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</table>

Courses listed below are open to students who have Junior standing. Prerequisites may apply.

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>307</td>
<td>Congress and State Legislatures</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>The American legislative process. Institutional setting and process of decision-making, recruitment and socialization of legislators, and relationships between Congress and the remainder of the political system. Prerequisite: PSC 101.</td>
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</tr>
<tr>
<td>308</td>
<td>American Presidency</td>
<td>3 hrs.</td>
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<td></td>
<td>The role of the president in the American political system. Special emphasis is placed upon internal functioning of executive branch of government through analysis of structure and techniques of the national administration. Prerequisite: PSC 101.</td>
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</tr>
<tr>
<td>311</td>
<td>Scope and Methods in Political Science</td>
<td>3 hrs.</td>
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<td></td>
<td>An examination of the main concerns of political scientists and the methods used by political scientists. Students will gain an understanding of the history of the discipline and the research methods used by political scientists of all fields. Lab fee: Level 4. Prerequisite: AHS 300.</td>
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</tr>
<tr>
<td>316</td>
<td>Classical Political Philosophy</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>A careful analysis of the roots of political inquiry in selected works of ancient and medieval political philosophers such as Socrates, Plato, Aristotle, Cicero, Augustine and Aquinas. Major themes include the search for the just social order, the proper relationship between the citizen and the state, and other fundamental concepts of Western political institutions. (Same as PHL 316). Prerequisite: Nine hours of PSC, Philosophy and/or History.</td>
<td></td>
</tr>
<tr>
<td>317</td>
<td>Modern Political Philosophy</td>
<td>3 hrs.</td>
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<td>A critical examination of the philosophical foundations for modern politics that emerged from the 15th through the 19th century in Western Europe. Major themes and theorists include the concepts of individual rights, property, representation, majority rule, limited government, and revolution discussed in selected writings of Machiavelli, Hobbes, Locke, Rousseau, and J.S. Mill among others. (Same as PHL 317). Prerequisite: Nine hours of PSC, Philosophy and/or History.</td>
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</table>
American Political Thought  
An indepth study of theorists, concepts, and forces that have shaped American political values from the founding of the republic to the present. Major themes include the relationship between liberty and equality, rights and democracy, and industrialization and the public good.

American Federalism  
Function and importance of federalism and intergovernmental relations in the American political system. Role of the state, local and regional governments as partners in the federal arrangement. Prerequisite: PSC 101 or PSC 221.

Parliamentary Systems  
Introduction to the governments and political systems of western European democracies. Considers their socio-economic contexts and accounts for their similarities and differences in terms of historical and contemporary economic, social, and cultural factors. Prerequisite: PSC 135.

Communist Systems  
Examination of Marxist theory in various national settings. Attention is focused on evolution of Communist regimes and parties in different states in relation to temporal and environmental challenges. Prerequisite: PSC 135.

Third World Systems  
Study of growth and decay of third world nations, their socio-economic problems and their political responses to the requirements of economic and social change. Prerequisite: PSC 135.

Modern China and Japan: Government and Politics  
An examination of historical cultural and social factors and current political practices in these two countries of major world importance. Prerequisite: PSC 135.

International Law and Organization  
Contribution of international law and organization to world order since World War II. Role of the United Nations in the third world and to political and sociological origins of international law and its application to selected contemporary problems. PSC 135 or PSC 246 is recommended.

Public Administration  
Administrative principles and practices in public organizations and agencies. Prerequisite: PSC 101.

Elections and Public Opinion  
Examination of theories of electoral behavior and their utility in understanding voter decision making. The formulation, manipulation, and impact of public opinion on American politics are assessed. Prerequisite: PSC 101.

Political Parties and Interest Groups  
Reviews the roles of two major “linkage” institutions in U.S. politics. Considers the organizational features of these institutions and their impact upon the electoral and policy making processes. Prerequisite: PSC 101.

American Constitutional Law  
The policy-making role of the Supreme Court in the American political system through analysis of leading cases in interpreting the constitution. Prerequisite: PSC 101. PSC 271 is recommended.

Political Sociology  
Examination of concepts, theories, and research findings related to the structure of political institutions in society and their relation to other societal institutions. Stratification, correlates, bases, legitimation, and change of power in society. Prerequisite SOC 100 or PSC 101. (Same as SOC 382.)
399 Directed Study in Political Science 1-3 hrs.
Independent studies in an area of political science selected in consultation with faculty advisor. Approval of chairman required.

419 Contemporary Political Ideologies 3 hrs.
A critical examination of the nature and ideologies in contemporary politics. Among the major political belief systems studied will be important examples of conservatism, liberalism, socialism, communism and fascism in theory and practice. Prerequisite: Nine hours of PSC, Philosophy and/or History.

423 Urban Politics 3 hrs.
Examination of urban politics in America with attention given to urban problems, urban environment, governmental forms, power structures, and policy outputs. Prerequisite: PSC 101. PSC 221 or PSC 323 is recommended.

450 Public Bureaucracy 3 hrs.
An examination of the institutional and environment factors shaping governmental bureaucracy and the application of private organizational theory to the bureaucracy. Prerequisite: PSC 101.

465 American Foreign Policy 3 hrs.
Study of the institutions, processes and personalities affecting the formation of American foreign policy. Prerequisite: PSC 101. PSC 135 is recommended.

467 Soviet Foreign Policy 3 hrs.
An introductory examination of the nature of Soviet foreign policy, with a special emphasis upon East-West relations and the Soviet decision making and policy implementation processes. Recommended: PSC 246 and/or PSC 337.

471 Civil Liberties 3 hrs.
Judicial interpretations of contemporary questions involving rights of individuals and limits of freedom of action in American society. Prerequisite: PSC 101. PSC 271 and/or PSC 371 are recommended.

480 Special Topics in Political Science 1-3 hrs.
Study of selected topics in local, state, national and world politics.

495 Internship in Government 1-6 hrs.
Undergraduates may receive from one to 6 hours of academic credit for an internship with local, state, or federal governmental agencies. Students must attend internship seminars, keep a log of activities, and submit a report on their internship.

580 Special Topics in Political Science 1-3 hrs.
Study of selected topics in local, state, national and world politics.

598 Studies in Public Administration 1-3 hrs.
Special studies and projects in Public Administration.

599 Studies in Political Science 1-3 hrs.
Special studies and projects in political science. Approval of chairman required.

Graduate Program
The Master of Arts in Public Affairs is a graduate program focusing on the study of the theory and processes of policy making with a general emphasis on management problems of public organizations.

Admission Requirements
Applicants must meet the general requirements for admission to the School of Graduate Studies, and be recommended for approval by the department's graduate committee prior to admission to the program.
Degree Requirements
The Master of Arts in Public Affairs requires 37 hours of approved graduate work form the following courses:

Plan I Thesis Option:
1. Sixteen hours required of all students: AHS 600, MGT 623, PSC 618, 660, 661.
2. Minimum of nine hours from one of the following areas (a, b, c) and six additional hours from these areas (a, b, c) or PSC 695 - Internship in Government.
   a. National Security and International Affairs (PSC 646, 665, 667, 668, 689)
   b. Politics, Economics and American Society (PSC 620, 623, 657, 678, 689, ECN 540, 548)
   c. Public Management (MGT 622, 624, PSC 650, 652, 655, 657, 678, 680, 685)
3. Minimum of six hours of Master’s Thesis [PSC 699].

Plan II Non thesis option:
1. Sixteen hours required of all students: AHS 600, MGT 623, PSC 618, 660, 661.
2. Minimum of nine hours from one of the following areas:
   a. National Security and International Affairs (PSC 646, 665, 667, 668, 689)
   b. Politics, Economics and American Society (PSC 620, 623, 657, 678, 689, ECN 540, 548)
   c. Public Management (MGT 622, 624, PSC 650, 652, 655, 657, 678, 680, 685)
3. Remaining twelve hours from courses listed above or Internship (PSC 695)

Graduate Courses
PSC 618 Public Values and Public Policy 3 hrs.
A critical examination of the normative aspect of public policy-making. This course focuses on the value assumptions of social theoretical paradigms that influence the design of public policy and on the ethical and moral implications of those designs. Major themes include ideological biases of empirical analyses and evaluations in the policy sciences, ethics of social policy formation, and moral problems of economic distribution, and redistribution.

PSC 620 Intergovernmental Relations 3 hrs.
Intergovernmental relations in the U.S. Specific government programs are discussed in terms of funding arrangements, policy decisions, and program administration.

PSC 646 Seminar in International Politics 3 hrs.
Examination of critical factors affecting the conduct of international relations. Course will emphasize courses of war and peace and factors influencing changes in the world state system.

Introduction to public management as a field of study and Practice. Review of basic literature. Emphasis on ethics in public service.

PSC 652 Public Personnel Administration 3 hrs.
Purposes, functions, and processes of personnel management at the national, state, and local levels.

PSC 655 Budgetary Process 3 hrs.
Governmental revenue and expenditure policies. Budget as a method of administrative and fiscal control.

PSC 657 Complex Organization in Industrial Society 3 hrs.
This course will expose students to mainstream and critical sociological theories for understanding complex organization in industrial societies. Specific areas to be covered include: historical development, structure and processes, contradictions and conflict, and alternative forms. (Same as SOC 657).
PSC 660 Public Policy Determination  
Study of economic, political, social, and institutional factors which influence the policy-making process and the impact of policy decisions made by the national, state, and local levels of government. Examination of the steps in policy-program analysis.

PSC 661 Public Policy Evaluation  
Survey of Evaluation Research Methods including experimental, quasi-experimental, and non-experimental research designs and statistical analysis. In addition, the problems and issues of presentation, implementation, and utilization of results will be examined. Prerequisite: AHS 600.

PSC 665 American Foreign Policy  
An analysis of major theories explaining foreign policy and various controversies surrounding policy processes and issues.

PSC 667 Soviet Foreign Policy  
A graduate seminar devoted to both the substance of Soviet foreign policy and the assumptions; theoretical frameworks; and methodologies employed by Western students of Soviet policy.

PSC 668 National Security Policy  
An examination of the evolution of U.S. security policy in the post-1945 era, with a special focus upon the theory and practice of deterrence; the nature of Soviet military doctrine; and the problems associated with disarmament and arms control. Undergraduate course in I.R. recommended.

PSC 678 Administrative Law and Regulations  
Judicial influences and controls on exercise of administrative authority with analysis of governmental regulatory policies.

PSC 680 Special Topics in Public Administration  
Study of selected current issues in Public Administration.

PSC 685 Problems in Public Administration  
Course will focus on case studies of major problems in Public Administration and examine the causes or the solutions to these problems.

PSC 689 Public Policy Seminar  
Course will focus on specific policy areas of the national government such as foreign policy, science policy or national security policy.

PSC 695 Internship in Government  
Graduate students may receive from one to six hours of academic credit for an internship with local, state, or federal governmental agencies. Students must attend internship seminars, keep a log of activities, and submit a report on their internship.

PSC 699 Master's Thesis  
A student must enroll for one to three thesis hours every term that he or she is writing and receiving direction on a master's thesis. A minimum of two terms and six thesis hours is required for the thesis option. No more than six hours credit may be applied toward the degree.
Psychology Department
Professors Kirkpatrick (chair), Rogers; Associate Professors Hays, James, Sullins; Assistant Professors Carpenter, Dittmar.

The Department of Psychology offers the B.A. and M.A. degrees in psychology.

Undergraduate Program

Psychology Major

A major in psychology consists of 33 hours in psychology with at least 24 hours of these courses numbered 300 or above. Required courses are PY 103, PY 302, two Issues courses (PY 410, 411, 412, 413, 414, 415, & 416), and PY 500 & PY 501. Issues courses will be offered on a rotating basis with an attempt to offer at least one each term of the year. (AHS 300 is a prerequisite for PY 302 but is not counted toward the 33 hours in psychology.)

The psychology major must be accompanied by a minor which meets the requirements specified by the selected discipline.

A student planning to major in psychology should complete PY 103, AHS 300 and PY 302 no later than the sophomore year. Before taking more advanced courses the student should seek advice in planning a program of study from a faculty member in the Psychology Department.

Psychology Minor

A minor in psychology consists of 21 hours of psychology courses, including PY 103, one Issues course (PY 410, 411, 412, 413, 414, 415 or 416), and an additional 15 hours of courses numbered 300 or above (which may include AHS 300).

Psychology for Second Area of Study

A student majoring in elementary education may choose psychology as the second area of study. See major requirements in the Education section. To meet university requirements, a student must select a minimum of 18 hours in psychology (including 15 hours at the 300 level or above) with the help of the education advisor and approval of the chairperson of the Psychology Department. This curriculum may require more than the minimum total of 128 hours for the degree.

PSYCHOLOGY (PY)

103 General Psychology 3 hrs.
Empirical findings of major areas of psychology such as perception and sensation, learning and memory, cognition, social psychology, personality, and abnormal behavior. The student must engage in approved experiential activities such as subject participation in a current research study or in laboratory, lecture, and video experiences designed to illustrate the development, testing and validation of psychological knowledge.

203 Principles of Behavioral Analysis 3 hrs.
Principles governing relationship between behavior and environment. Reinforcement, extinction, discrimination, and chaining. The student must engage in approved experiential activities such as subject participation in a current research study or laboratory, lecture, and video experiences designed to illustrate the development, testing and validation of psychological knowledge.
207  Psychology of Personal Adjustment  3 hrs.
Application of basic principles in psychology to origin and resolution of personal
conflicts. The student must engage in approved experiential activities such as sub-
ject participation in a current research study or laboratory, lecture, and video experi-
ences designed to illustrate the development, testing and validation of psychological
knowledge. Prerequisite: PY 103.

215  Child Psychology  3 hrs.
Overview of information, topics, viewpoints and issues in child psychology with pro-
fessional and personal applications. The student must engage in approved experien-
tial activities such as subject participation in a current research study or laboratory,
lecture, and video experiences designed to illustrate the development, testing and
validation of psychological knowledge. Prerequisite: PY 103.

302  Experimental Psychology  3 hrs.
Design and execution of experiments in psychology. Data analysis and manuscript
preparation. Offered Fall and Spring. Course includes laboratory. Fee: Level 3. Pre-
requisite: 3 hours PY and AHS 300.

311  Individual Differences  3 hrs.
The study of individually unique patterns of behavior. Both social and biological
influences will be examined. Prerequisite: PY 103.

315  Developmental Psychology  3 hrs.
Study of cognitive, psychoanalytic, ethological, behavioral, and humanistic theories
of development. Prerequisite: PY 103.

330  Psychology of Communication  3 hrs.
Theories, problems, and research in areas of interpersonal, nonverbal, and mass com-
munication, formulating a psychological conception of man as an information-gath-
ering and information-processing system. Empirical study of nonverbal communica-
tion.

375  Social Psychology  3 hrs.
Examination of the social influences on both individual and group behavior. Topics
may include attitudes, group processes, intergroup conflict, interpersonal attraction,
aggression, altruism, and impression formation. Prerequisite: SOC 100 or
PY 103.

380  Cognition  3 hrs.
A study of information processing: how we acquire, encode, organize, store, and re-
trieve information. This process will be applied to specific areas of psychology such
as language, learning, or personality. Prerequisite: 6 hrs. Psychology.

390  Readings in Psychology  3 hrs.
Supervised in-depth readings in area of particular interest to student. Prerequisite: 15
hours PY and approval of instructor. May be taken twice for credit.

391  Special Topic in Psychology  1 hr.
Study of preannounced special areas in seminar discussion, laboratory work, or prac-
ticum. Prerequisite: 15 hours PY. May be taken twice for credit.

392  Special Topic in Psychology  2 hrs.
Study of preannounced special areas in seminar discussion, laboratory work, or prac-
ticum. Prerequisite: 15 hours PY. May be taken twice for credit.

401  Personality  3 hrs.
Examination of various theories of personality with possible implications for research.
Prerequisite: PY 103.

410  Issues in Developmental Psychology  3 hrs.
Examination of issues, problems, and relevant research in developmental psychol-
ogy. Prerequisite: PY 315.
411 Issues in Motivation and Emotion 3 hrs.
Motivational and emotional dynamics relating to stress, depression, anxiety, and pleasure. Prerequisite: Junior or senior standing.

412 Issues in Personality 3 hrs.
In-depth study of the problems, procedures and theoretical issues involved in the study of personality. Prerequisite: PY 401.

413 Issues in Applied Social Psychology 3 hrs.
Topics in social psychology as applied to situations of practical interests. Prerequisite: PY 375 or SOC 375.

414 Issues in Learning 3 hrs.
Analysis of learning principles from simple relationships with animals to the complexities of human language and problem-solving. Prerequisite: Junior or senior standing.

415 Issues in Abnormal Psychology
Examination of relevant research in selected areas of abnormal-clinical psychology such as biochemical issues on the development of schizophrenia; dynamic issues in personality disorders; cognitive issues in depression; fear and courage. Prerequisite: PY 433 and upper level or graduate standing in Psychology.

416 Issues in Perception
This course will examine philosophical and methodological issues pertaining to the empirical study of perception. Emphasis will be placed upon the processes and structure of visual attention and perception, with additional work in the areas of hearing and taste. Prerequisite: 6 hrs. Psychology.

420 Seminar in Psychology 3 hrs.
Presentation and discussion of reports on psychological problems within a particular area. Prerequisite: 15 hours PY and approval of instructor. May be taken twice for credit.

422 Individual Research 3 hrs.
With advice of instructor, design and execution of original experiment in psychology. Prerequisite: 15 hours PY and approval of instructor. May be taken twice for credit.

426 History and Systems in Psychology 3 hrs.
History of psychology as it has led to development of systematic study within the field. Prerequisite: 15 hours PY.

433 Abnormal and Health Psychology for the Human Service Professions 3 hrs.
Individual patterns and social contexts of integrative and maladaptive emotions and behavior. Prerequisite: PY 103.

436 Physiological Psychology 3 hrs.
Neural and endocrinological systems underlying behavior. Prerequisite (either a or b): (a) 15 hours of PY or approval of instructor; (b) BYS 114 or BYS 313 and 6 hours of PY or approval of instructor. (Same as BYS 436).

500 Human Research I 2 hrs.
The study of human behavior by observation and/or experimentation. Students will design a study dependent upon the context of a previously completed Issues course, will engage in data collection and analysis, and will report their findings in a research paper. (offered Winter term of each year). Includes laboratory. Fee: Level 3. Prerequisites: PY 302, one Issues course (PY 410-414), and Senior/graduate standing.

501 Human Research II 3 hrs.
A required continuation of PY 500. (Offered Spring term of every year). Includes laboratory. Fee: Level 3. Prerequisite: PY 500 and Senior/graduate standing.
Graduate Program

The Psychology faculty offers courses leading to the Master of Arts degree as specified in Plan I of the School of Graduate Studies. Studies are oriented toward providing an understanding and appreciation of the scientific basis of behavior general-experimental with areas of concentration available in social/personality, developmental psychology, learning and cognition, abnormal, and perception/human factors. This program is primarily directed toward the student whose goal is the continuation of scholarly study, research, and writing. This program is not meant to qualify students for licensure, private practice or for providing psychological services without further advanced education.

Admission Requirements

In addition to the general requirements for admission to the School of Graduate Studies, this program requires a minimum combined score of 1100 on the verbal and quantitative portions of the Graduate Record Examination, an overall grade point average of 3.25 or a minimum of 3.25 for the last 60 hours of work, and very strong positive recommendations. Fifteen hours of psychology, approved by the graduate committee of the department, are required for admission. Applications for admission must include three letters of recommendation from former professors, including at least one from a psychology professor as well as a statement specifying your intent for graduate study and at least one (preferably two) papers (preferably experimental) authored by the applicant. Recommendations should be sent to: The Graduate Committee, Department of Psychology. Applications are not acted upon until all materials are complete.

Degree Requirements

In addition to the Graduate School requirements, the requirements for the Master of Arts are:

1. At least 30 hours of graduate work, including six hours of thesis. A maximum of six hours may be transfer courses approved by the graduate committee of the department.
2. The following four courses are required of all students; PY 602, PY 604, PY 611 and PY 613 or AHS 600. Three of these four courses must be completed before taking PY 641.
3. Following the completion of at least three of the four required courses listed above, each student must complete at least three hours of Directed Individual Study, PY 641, prior to beginning work on his/her required thesis.
4. The remaining courses will be selected, with then advice of the student's advisor from graduate level courses in Psychology, and may, with approval of the graduate committee of the department, include up to 6 hours of graduate courses from related departments
5. An oral comprehensive examination is required of all students. This examination covers both course work and the thesis.

GRADUATE COURSES IN PSYCHOLOGY (PY)

The 500 level courses listed below are offered at the senior/graduate level except for courses noted below. Courses numbered 510-516 have the same basic content as their undergraduate counterparts (410-416 level), with the exception that the graduate student will be given additional assignments and attention appropriate to graduate level study. Only admitted graduate students may enroll in 600 level courses.
500  Human Research I  2 hrs.
The study of human behavior by observation and/or experimentation. Students will
design a study dependent upon the context of a previously completed Issues course,
will engage in data collection and analysis, and will report their findings in a research
paper. (Offered Winter term of each year). Includes laboratory. Fee: Level 3. Pre-
requisites: PY 302, one Issues course (PY 410-414), and Senior/graduate standing.

501  Human Research II  A required continuation of PY 500. (Offered Spring term of every year). Includes
laboratory. Fee: Level 3. Prerequisite PY 500 and Senior/graduate standing.

502  Industrial and Organizational Psychology  3 hrs.
Application of basic principles of learning, motivation, and perception to typical
industrial and organizationa problems. Prerequisite: Senior/graduate standing.

503  Advanced General Psychology  3hrs.
Survey. Various major areas of psychology. Open only to senior psychology majors
and graduate students. Prerequisite: 24 hours PY and Senior/graduate standing.

510  Issues in Developmental Psychology  3 hrs.
Examination of issues, problems, and relevant research in developmental psychol-
ology. Graduate credit only.

511  Issues in Motivation and Emotion  3hrs.
Motivational and emotional dynamics relating to stress, depression, anxiety and
pleasure. Graduate credit only.

512  Issues in Personality  3hrs.
In-depth study of the problems, procedures and theoretical issues involved in the study
of personality. Graduate credit only.

Topics in social psychology as applied to situations of practical interests. Graduate
credit only.

514  Issues in Learning  3 hrs.
Analysis of learning principles from simple relationships with animals to the com-
plexities of human language and problem-solving. Graduate credit only.

515  Issues in Abnormal Psychology  3hrs.
Examination of relevant research in selected areas of abnormal-clinical psychology
such as biochemical issues on the development of schizophrenia; dynamic issues in
personality disorders; cognitive issues in depression; fear and courage. Graduate credit
only.

516  Issues in Perception  3 hrs.
This course will examine philosophical and methodological issues pertaining to the
empirical study of perception. Emphasis will be placed upon the processes and struc-
ture of visual attention and perception, with additional work in the areas of hearing
and taste. Graduate credit only.

530  Psychometrics  3 hrs.
History and development of psychological testing with special emphasis given to both
theory and process of effective evaluation. Prerequisites: AHS 300, Senior/graduate
standing.

535  Theory of Abnormal Psychology  3 hrs.
Major behavior exceptionalities of childhood and adulthood with emphasis on em-
pirical findings. Prerequisite: PY 433 or approval of instructor and Senior/graduate
standing.

257
601 Advanced Developmental Psychology 3 hrs.
An overview of major models of developmental theory and of theorists representing these models. Examination of issues, problems and research relevant to these theories.
Prerequisites: PY 315 or equivalent as approved by instructor and graduate standing.

602 Proseminar: Cognitive 3 hrs.
Critical examination of the cognitive approach to areas of study within Psychology. Students will be responsible for library research, writings, and presentation of selected topics. (Offered once each year.) Prerequisite: Graduate standing in Psychology.

604 Proseminar: Experimental 3 hrs.
Critical examination of the experimental approach to areas of study within Psychology. Students will be responsible for library research, writings, and presentation of selected topics. (Offered once each year.) Prerequisite: Graduate standing in Psychology.

606 Language Development 3 hrs.
Stages and processes of the development of language and communication skills. Prerequisite: Graduate standing in Psychology.

Experimental design and appropriate statistical techniques for psychological research. Includes laboratory for statistical applications. Fee: Level 6. Prerequisites: AHS 300 and PY 302 or equivalents as approved by instructor and graduate standing in Psychology.

613 Research Methods and Statistics II: Nonexperimental Designs 4 hrs.
Methods of psychological research in areas where direct manipulation of independent variables is infeasible. Observation, questionnaires, modeling, regression analysis, cluster and factor analysis and scaling processes. Laboratory included. Fee: Level 6. Prerequisites: AHS 300 and PY 302 or equivalents approved by instructor and graduate standing in Psychology.

615 Graduate Seminar 3 hrs.
Intensive analysis of selected theoretical or applied topics relating to psychological development. Prerequisite: graduate standing.

628 Human Learning Theory 3 hrs.
Critical examination of behavior changes commonly called "learning," as well as closely related behavioral phenomena such as transfer, retention, and stimulus generalization. Prerequisite: graduate standing in Psychology.

629 Behavior Modification 3 hrs.
Psychological principles concerning control of human behavior and current theoretical and experimental research in behavior modification. Prerequisite: graduate standing in Psychology.

641 Directed Individual Study and Research I 3 hrs.
Independent readings and/or experiments in an area within the student's field of specialization. One of the requirements of this course is a major research paper, of publishable quality, which will be reviewed by the faculty of the department. May be taken more than once for credit. Prerequisites: Completion of any three of the following: PY 602, 604, 611, 613/AHS 600; and permission of instructor. (In exceptional individual instances some of these prerequisites may be waived by the graduate committee of the department.)
Symbolic Processes  
Psychology of processing symbolic material. Prerequisite: graduate standing in Psychology.  
3 hrs.

Master's Thesis  
A course required each term a student is working on, and receiving faculty direction on, the master's thesis. A minimum of two terms is expected, but no more than six hours is allowed, for the thesis. Credit awarded upon successful completion of the thesis. Prerequisite: PY 641 and graduate standing in Psychology.  
3 hrs.

Sociology Department  
Associate Professors Finley (chair), Colclough, Haralick, Hodges, Tarter: Assistant Professor Peacock.

The Department of Sociology offers the B.A. and a minor in sociology.

Sociology Major  
In addition to the General Education Requirements (GER) for the B.A., students who major in sociology must complete 37 hours of sociology courses including:

I. SOC 100 Introduction to Sociology  
AHS 300 Social Statistics  
SOC 300 Research Methods  
SOC 465 Sociological Theory

II. It is recommended that students take at least 6 hours from each of the following clusters:

Cluster 1  
SOC 350 Social Stratification  
SOC 455 Sociology of Work and Occupations  
SOC 470 Social Organization  
SOC 450 Medical Sociology  
SOC 380 Sociology of Science and Technology  
SOC 382 Political Sociology  
SOC 333 Sociology of the South  
SOC 335 Future Social Trends  
SOC 200 Introduction to Anthropology

Cluster 2  
SOC 106 Marriage and Family  
SOC 306 Gender Roles  
SOC 310 Sociology of Childhood  
SOC 311 Life Span Development  
SOC 319 Deviance and Social Control  
SOC 325 Sociology of Education  
SOC 345 Social Gerontology  
SOC 375 Social Psychology  
SOC 452 Sociology of Mental Health

III. A minimum of 21 hours should be taken in courses numbered 300 or above.
Sociology Minor

A student developing a minor in sociology with a major in another discipline must complete 21 hours of sociology courses including SOC 100 and SOC 102. A minimum of 12 hours should be in courses numbered 300 or above. Sociology courses may also be used in conjunction with courses from other disciplines to form a cognate area of study. Such a program should be developed with the advice of the sociology faculty and approved by the chair of the student’s major department.

Sociology for a Second Area of Study

Students majoring in elementary education may select sociology as their second area of study. See major requirement in the Education section. To meet university requirements, students must complete a minimum of 18 hours in sociology, 12 of which must be above the 300 level in sociology. Courses should be chosen with the help of the education advisor and approval of the chair of the Department of Sociology. The recommended program is:

SOC 100 Introduction to Sociology
SOC 102 Social Problems
or
SOC 106 Marriage and Family
SOC 325 Sociology of Education

3 additional courses in sociology at the level of 300 or above

(The following courses are especially useful for teachers:
SOC 306, SOC 310, SOC 311, SOC 330, SOC 333, SOC 350, SOC 375, SOC 452, SOC 470.)

Sociology (SOC)

100 Introduction to Sociology 3 hrs.
Perspective methods, concepts, and general findings of the sociologist. Historical and conceptual development of sociology.

Lower-division sociology courses listed below are open to students who have completed SOC 100.

102 Analysis of Social Problems 3 hrs.
Sociological interpretation of contemporary social problems as they relate to significant trends in complex societies.

106 Marriage and Family 3 hrs.
The family as a social institution, its structure and function in contemporary societies, dating, marital interaction, life cycle, and socialization process.

230 Mass Media in America: Theory and Criticism 3 hrs.
Mass communication theory, history of American mass media, and criticism of contemporary forms and functions of mass media of communication in the United States. (Same as CM 230).

200 Introduction to Anthropology 3 hrs.
Origin and development of man’s ways of life. Analysis of preliterate societies.

Upper-division sociology courses are open to students who have taken SOC 100.
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tr>
<td>300</td>
<td>Research Methods</td>
<td>3 hrs.</td>
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<td>Broad and balanced background in</td>
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<td>various types of social research</td>
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<td>methods. Fundamental logic and</td>
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<td>specific techniques in conducting</td>
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<td>research. Prerequisite: AHS 300.</td>
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<td>Lab fee: Level 4.</td>
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<td>306</td>
<td>Sex Roles</td>
<td>3 hrs.</td>
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<td>Social and sexual roles, their</td>
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<td>effect of sex-role changes</td>
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<td>in societies in transition.</td>
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<td>310</td>
<td>Sociology of Childhood</td>
<td>3 hrs.</td>
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<td>Environmental influences on</td>
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<tr>
<td></td>
<td>socialization of infants and</td>
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<tr>
<td></td>
<td>children. Various family roles, the</td>
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<tr>
<td></td>
<td>school, peer group, and culture</td>
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<tr>
<td></td>
<td>as they affect the growing child</td>
<td></td>
</tr>
<tr>
<td></td>
<td>and early adolescent.</td>
<td></td>
</tr>
<tr>
<td>311</td>
<td>Life Span Development</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Major social influences on</td>
<td></td>
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<tr>
<td></td>
<td>human development, change,</td>
<td></td>
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<tr>
<td></td>
<td>continuity, and discontinuity</td>
<td></td>
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<tr>
<td></td>
<td>from birth to old age. Turning</td>
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<tr>
<td></td>
<td>points and role throughout life</td>
<td></td>
</tr>
<tr>
<td></td>
<td>span. Prerequisite: SOC 310.</td>
<td></td>
</tr>
<tr>
<td>315</td>
<td>Population and Ecology</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Growth and distribution of world</td>
<td></td>
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<tr>
<td></td>
<td>population and environmental</td>
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<tr>
<td></td>
<td>problems created in relation to</td>
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<tr>
<td></td>
<td>population growth.</td>
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<tr>
<td>319</td>
<td>Deviance and Social Control</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Social construction of deviant</td>
<td></td>
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<tr>
<td></td>
<td>behavior and societal reactions to</td>
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</tr>
<tr>
<td>325</td>
<td>The Sociology of Education</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Education as a social institution;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>its structure, function, and role</td>
<td></td>
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<tr>
<td></td>
<td>in contemporary life. (Same as ED</td>
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<tr>
<td></td>
<td>325).</td>
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<tr>
<td>330</td>
<td>Minority Groups</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Nature of minorities: status</td>
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<tr>
<td></td>
<td>differentiation and group structure,</td>
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<tr>
<td></td>
<td>institutional trends, and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>intergroup relations.</td>
<td></td>
</tr>
<tr>
<td>333</td>
<td>Sociology of the South</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Examines the contemporary South</td>
<td></td>
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<tr>
<td></td>
<td>focusing on unique social processes</td>
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<tr>
<td></td>
<td>and cultural heritage leading to</td>
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<tr>
<td></td>
<td>its development.</td>
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<tr>
<td>335</td>
<td>Future Social Trends</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Major social trends that leading</td>
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<td>forecasters project for the next</td>
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<tr>
<td></td>
<td>25 years. Nature, methods, and</td>
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<td>outlook of modern social and</td>
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<tr>
<td></td>
<td>technical forecasters. (A course for</td>
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<tr>
<td></td>
<td>students with a variety of majors.</td>
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<tr>
<td></td>
<td>Sociology 100 helpful but not</td>
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<td></td>
<td>required.)</td>
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<tr>
<td>340</td>
<td>Special Topics</td>
<td>1-3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Nontraditional topics of current</td>
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<tr>
<td></td>
<td>sociological interest. Title of</td>
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<tr>
<td></td>
<td>course and number of credit hours</td>
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</tr>
<tr>
<td></td>
<td>when offered, will appear in course</td>
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<tr>
<td></td>
<td>schedule along with prerequisites</td>
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<tr>
<td></td>
<td>necessary for admission to course.</td>
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<td></td>
<td>Course may be taken more than once</td>
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<td></td>
<td>for credit as long as subtitles</td>
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<tr>
<td></td>
<td>differ.</td>
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<tr>
<td>345</td>
<td>Social Gerontology</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Theoretical and empirical approach</td>
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<td></td>
<td>to human aging process with its</td>
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<td></td>
<td>various social and cultural</td>
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<tr>
<td></td>
<td>aspects. Major problems and issues</td>
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<td>in aging and current programs</td>
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<td>designed to meet needs of the</td>
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<td>elderly.</td>
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<tr>
<td>350</td>
<td>Social Stratification</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Social class, social status, and</td>
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<td></td>
<td>social mobility. Social power and</td>
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<td></td>
<td>prestige. Differential opportunities</td>
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<tr>
<td></td>
<td>and resultant behaviors of upper,</td>
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<tr>
<td></td>
<td>middle, and lower social classes.</td>
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<tr>
<td>375</td>
<td>Social Psychology</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Fundamental principles of group</td>
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<td></td>
<td>processes, social influence, and</td>
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<tr>
<td></td>
<td>group structure. Development of</td>
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<tr>
<td></td>
<td>group solidarity, cohesion,</td>
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<td></td>
<td>intergroup conflict and</td>
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<td></td>
<td>cooperation, communication,</td>
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<tr>
<td></td>
<td>leadership, opinion, propaganda,</td>
<td></td>
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<tr>
<td></td>
<td>and suggestion. Prerequisite: PY 103</td>
<td></td>
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<tr>
<td></td>
<td>or SOC 100. (Same as PY 375).</td>
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</tr>
</tbody>
</table>
380 The Sociology of Science and Technology 3 hrs.
Survey of the social forces that shape the nature and direction of science and technology. Involves a critical look at modern science and technology. Prerequisite: SOC 100 helpful but not required.

382 Political Sociology 3 hrs.
Examination of concepts, theories, and research findings related to the structure of political institution in society and its relation to other social institutions. Stratification, correlates, bases, legitimation, and change of power in society. Prerequisite: SOC 100 or PSC 101. Same as PSC 382.

390 Readings and Individual Research 3 hrs.
Supervised readings or in-depth research or both in area of specialized interest to student or instructor. Permission of instructor. May be taken twice for credit with adviser’s approval.

The department recommends that 400 level courses be reserved for Junior or Senior standing or by permission of instructor.

440 Sociology of Religion 3 hrs.
Sociological principles applied to religious institutions; interaction of religion and society. Sects and cults, the religious commune, religion and social change, and contemporary religious issues.

450 Medical Sociology 3 hrs.
Relationship of sociology and social psychology to medicine. Role and status of medical and paramedical personnel in the United States; Health-care delivery systems and problems encountered.

452 Sociology of Mental Health 3 hrs.
Social construction of mental health and mental illness. Mental hospitals, community mental health center, and mental health movement.

455 Sociology of Work and Occupations 3 hrs.
Contemporary work situations and experiences. Alienation in work, impact of technological change and bureaucratization, primary work groups and work culture, professionalization, unionization, workers’ self-management experiments, and work-leisure relationship.

465 Sociological Theory 3 hrs.
Development of discipline of sociology in terms of major trends of sociological theory, past and present, and major theoretical problem areas. Nature of sociological theory in relation to other disciplines. Prerequisite: SOC 100, 102, and junior or senior standing.

470 Social Organization 3 hrs.
Introduction and critical exploration of the analysis of social units including groups, organizations, communities, societies, and the world system of societies. Various forms of analysis will be considered, from Marxist to Network approaches. Prerequisite: SOC 100.

657 Complex Organization in Industrial Society 3 hrs.
This course will expose students to mainstream and critical sociological theories for understanding complex organization in industrial societies. Specific areas to be covered include: historical development, structure and processes, contradictions and conflict, and alternative forms. Prerequisite: Senior or Graduate standing/permission of instructor.
Dean C. Fay Raines, B.S.N., M.S.N., Ph.D., Professor

The College of Nursing offers the undergraduate Bachelor of Science degree in Nursing and the Master of Science in Nursing in the graduate program. The professional components of the undergraduate and graduate programs are designed to give the student the theoretical and experiential base for current and future practice. The undergraduate curriculum provides general education options which foster personal development. The graduate program offers opportunity for specialization for advanced nursing practice.

The undergraduate program in Nursing is approved by the Alabama Board of Nursing. Both the baccalaureate and the masters programs in Nursing are accredited by the National League for Nursing.

Undergraduate Program

The undergraduate curriculum is divided into two components, the lower and upper divisions. Lower division courses establish the scientific base for future practice of nursing. The upper division concentrates on progressive experiences and professional nursing practice, as well as theory to support it. In addition, the student may select a cognate area of study or a minor. Graduates are prepared to accept employment in all beginning-level positions in nursing practice.

Beginning students are advised by the College of Nursing Advisement Office personnel. Continuing students are assigned an advisor from the nursing faculty and must meet with the adviser for program approval before registration each term.

Students transferring to UAH from other institutions should seek advisement from the College of Nursing before registration. The student transferring into the nursing program has the same options of testing for credit or advanced standing as other university students (see Admissions Information). Credit for at least one-half of the major nursing courses must be earned at UAH to complete requirements for the B.S.N. degree. Basic students are required to take the Mosby Assessment in the senior year.

Registered Nurses

Registered nurses may be admitted to the undergraduate program to meet requirements for the Bachelor of Science in Nursing degree. A specific schedule of required courses must be
pursued with the advisement of the Director of R.N. Education. Registered Nurses are allowed the opportunity, on the basis of their previous experience and licensure, to validate designated courses in the nursing curriculum by successfully passing two NLN Nursing Mobility Profile Examinations. This planned program also offers opportunities for part-time study and nontraditional hours at UAH and off campus sites.

To be admitted to upper division clinical courses of the nursing major, a Registered Nurse must present evidence of (1) current RN license in good standing in Alabama (2) current professional liability coverage (3) current CPR certification, (4) a letter of reference documenting satisfactory work experience as a Registered Nurse for the time period immediately prior to admission to the clinical portion of the major, and (5) meet requirement listed under Policies for Registered Nurses, Health Service and Responsibility to Agencies.

BSN/MSN Articulation Program for Registered Nurses

Registered Nurses holding Associate Degrees or Diploma in Nursing and have completed 60 semester hours of general education requirements are eligible to sit for validation exams and earn 29 semester hours toward the BSN degree. Graduate level courses are taken while pursuing the BSN degree and are not repeated when admitted to the MSN program.

Policies for Registered Nurses

1. All academic policies established by UAH and the College of Nursing will apply to registered nurses in the BSN program.

2. Academic advisement will be provided on an individual basis to assure that students follow the required sequence of courses in the nursing major.

3. Candidates for admission to the RN completion program must show proof of a current licensure in the state of Alabama. Applicant will not be eligible for admission or continuance in the RN completion program if license is suspended or revoked. In addition, a letter of reference from last employer will be required, assuming employment within last five years. Credit by examination is optional. Through testing, students may validate all or part of the junior year courses. Students are encouraged to seek advisement regarding the validation process.

4. Recent graduates of associate degree or diploma nursing programs who are not yet licensed may be admitted to UAH to complete lower division coursework, but will not be eligible for admission to the RN completion program until they are licensed in Alabama.

5. Students in the RN completion program must submit a plan for completion of the nursing major to the director of the program during the first term of course work. Time limits for completion of the program will be as stated in the UAH catalog.

6. Registered nurses will receive credit for junior year nursing courses, except NUR 330, on the basis of having obtained passing scores on the NLN Nursing Mobility Profile examinations. In addition NUR 384, Nursing Process in Professional Practice, must be successfully completed before progression to the senior level clinical courses. Arrangements for taking the NLN Nursing Mobility Profile exams are the responsibility of the registered nurse student.

7. Candidates may repeat each validation examination only one time. Failure to obtain a passing score after two attempts will result in the candidate having a successfully complete the appropriate course(s) in the junior year before progressing to the senior year.

8. Credits will be awarded for validation by examination only to students who have been admitted to UAH.

Health Requirements

The unique clinical experiences of students in the baccalaureate and graduate programs require a health surveillance program not applicable to other students in the university. The protection of the student’s own health as well as that of the patient necessitates the following regimen before any experience in patient-care agencies:

264
1. Health examination by a physician or a certified Nurse Practitioner and a dentist prior to beginning clinical sophomore, junior, senior nursing courses is required. Results of the examination must be submitted on forms provided by the College of Nursing at least two weeks before registration. This information must be on file with the Director of the Undergraduate Program or the Director of the Graduate Program before registration.

2. Admission to patient-care agencies depends on satisfactory reports of mental and physical health.

3. Students are advised to obtain health insurance. Hospitals and health agencies provide emergency treatment to students for injury or illness occurring in the course of carrying out program activities at the agency. Such treatment shall, however, be at the expense of the student.

4. Immunization for Hepatitis B is required prior to clinical nursing experience. The immunization is at the expense of the student.

Undergraduate Admission, Progression, Graduation Requirements

1. All lower division course requirements for the nursing major outlined in this section of the catalog should be completed before a student is admitted to the upper division component of the nursing major.

2. A minimum grade of C is required in all natural and behavioral science courses, mathematics, statistics, and in English composition courses.

3. A student admitted to the upper division major must have an overall 2.0 (C) average on all hours pursued, including all course work taken at other colleges and universities as well as at UAH.

4. A grade of C or above must be earned in required nursing courses. A student who receives a grade below C in a required nursing course may repeat the course one time only. (Required nursing courses include NUR 234, 321, 322, 330, 361, 372, 373, 423, 473, 480, 481.)

5. A student who receives two grades below C in required nursing courses at any time during the program, either in the same course or in separate courses, will not be permitted to continue in the program.

6. An overall 2.0 (C) average in all course work pursued, as well as in all courses taken in the nursing major, is required for graduation.

7. Activity courses credits accepted toward the degree will be limited as follows: Physical education — 3 credits; military science — 3 credits; music — 2 credits; art activity — 2 credits. A limit of four credits in any combination of these activity courses will be accepted toward meeting graduation requirements.

8. The practice of nursing requires high standards of personal qualities and behaviors as well as professional knowledge and skills. For this reason, a nursing student shall be subject to assessment of such qualities and behaviors as affective and emotional stability, maturity of judgment, responsibility, reliability, interpersonal relationships, integrity and ethical standards, physical and mental health, personal hygiene, compliance with campus and community standards of lawful conduct, and general moral character. A student whose suitability or fitness for nursing practice is deemed impaired by a deficiency in any of these areas may be dismissed from the nursing program. Such assessments shall be the responsibility of the faculty of the College of Nursing or a designated body of such faculty.

9. Students must meet standards for health as stated elsewhere in the catalog.

10. Requests for exceptions to any of the above requirements are to be directed to the Academic Affairs Committee of the College of Nursing.

11. In addition to the above requirements, registered nurse students must comply with Policies for Registered Nurses.
Responsibility to Agencies
Students practicing in patient-care agencies must be acceptable to those agencies and are responsible for complying with policies and procedures required by the agency, including coverage by malpractice insurance when enrolled in clinical courses. Failure to meet this requirement may mean that the student is excluded from required practice and prevented from completion of the program.

Baccalaureate Program of Studies

**Lower Division:** 63 semester hours

<table>
<thead>
<tr>
<th>Natural Science, Mathematics, and Statistics:</th>
<th>Semester Hours</th>
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</thead>
<tbody>
<tr>
<td>Biological Sciences (BYS 112, 214, 313, 314)</td>
<td>16</td>
</tr>
<tr>
<td>Chemistry (CH 101, 105)</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics (Level I)</td>
<td>3</td>
</tr>
<tr>
<td>(If placed at Level II or above, student may use 3 hours as an elective.)</td>
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<tr>
<td>Statistics (a statistics course offered in any department)</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
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</tbody>
</table>

| Social and Behavioral Sciences:              |                |
| Sociology (SOC 100, 106)                    | 6              |
| Psychology (PY 103)                         | 3              |
| Elective                                    | 3              |
| Total                                       | 12             |

| Humanities:                                  |                |
| English composition (EH 101 and 102)        | 6              |
| Literature or history (two courses in sequence) | 6          |
| Human Development                           | 3              |
| Elective                                    | 3              |
| Total                                       | 18             |

| Elective                                     | 3              |

| Nursing:                                     |                |
| Lower division core (NUR 234)               | 4              |

**Upper Division:** 65 semester hours

| Clinical nursing core courses (NUR 361, 372, 373, 480, 481, 473) | 47 |
| Introduction to Pharmacology (NUR 321)                         | 2  |
| Nutrition in Nursing (NUR 322)                                 | 2  |
| Introduction to Health Assessment (NUR 330)                    | 3  |
| Research Process in Nursing (NUR 423)                          | 2  |
| Electives                                                     | 9  |
| Total                                                         | 65 |

**Summary**
A total of 128 semester hours of credit is required for the B.S.N. degree. As specified in the program of studies, 60 semester hours of nursing constitute the major area of concentration.
Nursing (NUR)

234  Foundations of Nursing  4 hrs.
Theoretical foundations and clinical skills of nursing practice including nursing process, levels of prevention, adaptation, communication, role, and health-care systems. Laboratory and selected clinical experiences included. Lab fee: Level 7. Sp, S.

321  Pharmacology in Nursing  2 hrs.
Major drug classifications and therapeutic uses. Legal and ethical implications. Lab fee: Level 1. Prerequisite: NUR 234.

322  Nutrition in Nursing  2 hrs.
Knowledge and principles of nutrition applied to individual health needs. Lab fee: Level 1. Prerequisite: NUR 234.

325  Human Sexuality  3 hrs.

330  Introduction to Health Assessment  3 hrs.
Basic concepts and techniques of interviewing, history-taking, and physical assessment emphasizing normal findings. Lab fee: Level 7.

332  Nursing Care of Persons Experiencing Surgical Interventions  3 hrs.
A study of the role of the nurse in providing Nursing Care for clients experiencing surgical intervention. The nursing process provides the framework for promoting quality perioperative nursing care for the client and his family. Lab fee: Level 3. Junior standing.

334  Death and Dying  3 hrs.
Influence of death and dying upon attitudes and thinking gleaned from historical, cultural, philosophical, and scientific perspectives. Intimate reactions and beliefs concerning death and identifying coping resources. Elective. Lab fee: Level 2.

337  Nursing as a Political Force  3 hrs.
An overview of the legislative process and legislation relative to health care issues. The role of the professional nurse in the political climate is explored. Elective.

338  Drug and Other Substance Abuse  3 hrs.
The study of issues arising from the intentional or inadvertent abuse or misuse of drugs and food; the legal and physical implications of such behavior. Emphasis is placed on theories of causation and treatment of methodologies. Elective. Open to non-majors. Lab fee: Level 1.

339  Introduction to Computers in Nursing  3 hrs.
Provides experience in the use of basic and versatile software programs which have wide applicability within nursing practice and within the students educational process. Lab fee: Level 3. Elective.

361  Bases of Nursing Practice  7 hrs.

372  Nursing Process across the Life Span  8 hrs.
Nursing theory and process related to caring for individuals of all ages experiencing alteration in health. Emphasis is placed on the impact of long term illness. Clinical experiences in acute, long term care, and rehabilitation are included. Lab fee: Level 8. Prerequisite: NUR 321, 322, 361.
373 Nursing Process in Care of the Developing Family 8 hrs.
Nursing process used to promote health and facilitate adaptation in child-bearing and child-rearing families. Clinical experiences in maternity, community, and pediatric settings. Lab fee: Level 8. Prerequisite: NUR 361.

384 Nursing Process in Professional Nursing 2 hrs.
This course addresses the philosophical, social and ethical principles inherent in the practice of professional nursing. Emphasis is on the use of the nursing process and theoretical bases for professional nursing practice. Prerequisite: Registered Nurse. Lab fee: Level 2.

390 Independent Study 1-4 hrs.
Individualized independent study of specific nursing problem under sponsorship of a nursing faculty member with special preparation in the field. Elective.

402 Health Care and the Law 3 hrs.
A study in health care law designed to integrate pertinent aspects of law into the study and/or practice of health care. Lab fee: Level 1.

413 Applied Pathophysiology 3 hrs.
An exploration of human adaptation and alteration in system function as a basis for nursing decision making. Clinical simulations assist the student in selecting appropriate interventions. Elective. Prerequisite: Senior level or permission of instructor. Lab fee: Level 1.

423 Research Process in Nursing 2 hrs.
Research process applied to problems in nursing as a basis for evaluation of existing practice and research. Lab fee: Level 1. F, Sp.

473 Nursing Leadership in Professional Practice 8 hrs.
Principles of leadership and management related to delivery of nursing care. Students work in selected health care facilities with preceptors. Prerequisites: NUR 480 and 481. Lab fee: Level 8.

480 Nursing Process in Community Health 8 hrs.
Nursing process used to promote health and foster adaptation in individuals, families, and communities. Clinical experiences in selected community health agencies and selected settings. Lab fee: Level 8.

481 Nursing Process in Acute Care Nursing 8 hrs.

Graduate Program

The College of Nursing offers the Master of Science in Nursing Degree as well as the BSN/MSN articulation program for registered nurses, which builds upon and augments the scientific and professional base provided in baccalaureate-level study.

The Master of Science in Nursing degree augments the professional base provided in baccalaureate-level study. It provides a theoretical and clinical base which enables the graduate to engage in advanced professional practice. The program is designed for five terms of full-time study. Part-time study is available and encouraged.

Clinical experiences in the graduate program use the total family as the primary unit of care. Opportunities for student learning are individualized while developing advanced skills and knowledge in three clinical majors: Adult Acute Care Nursing, Home Health Care Nursing, or Family Nurse Practitioners. The Adult Acute Care track has the role development options of teaching, supervision or home health care administration. The Family Nurse Practitioner and
Home Health Care tracks have the Practice Role development. All graduates, upon completion of the program, are eligible to sit for national certification in selected areas.

Special Facilities
Madison County has three general hospitals with a licensed capacity of 1,013 beds, one army hospital licensed for 42 beds, a county health department, and five skilled nursing homes with approximately 685 beds. The University Medical Clinics serve as a clinical site for students in the College of Nursing. In addition, there are multiple home health care facilities available.

Huntsville Hospital (578 beds), the largest general hospital in the northern part of the state, is the regional medical care center for north Alabama and southcentral Tennessee. The hospital offers comprehensive emergency treatment facilities and the only newborn intensive care unit in north Alabama. Crestwood Hospital (120 beds) is a private general hospital fully equipped to handle most diagnostic and surgical procedures. Humana Hospital Huntsville (315 beds), the largest private hospital in the area, is a general, acute care hospital with a complete range of surgical, medical, and obstetrical services. Fox Army Community Hospital provides complete outpatient care and general medical and surgical short-term acute care. Rural health clinics in Jackson County are also used for student experiences. Other hospitals, clinics, and physicians' offices are used on a selected basis.

Admission Requirements
In addition to meeting the requirements for admission to the School of Graduate Studies, requirements for admission to the graduate program in nursing are:

1. Graduation from a National League for Nursing accredited baccalaureate program with a major in nursing.
2. Grade point of 3.0 on a 4.0 scale in all undergraduate nursing courses or on the last 60 semester hours in nursing.
3. Evidence of a current license to practice as a registered nurse in Alabama.
4. Three letters of reference, at least one of which is from a current nursing employer or supervisor and one of which is from a previous faculty member or dean.
5. One undergraduate (AHS 300 or MSC 287) course in basic statistics.
6. A minimum of one year of full-time professional nursing practice.
7. Personal interview (may be required).

Once a student has been admitted to the graduate program, and prior to registration in a clinical course, the following must be on file with the Director of the Graduate Program:

1. A health and dental examination by a medical physician or a certified Nurse Practitioner and dentist with results of the examination submitted on forms provided by the College of Nursing.
2. Documentation of personal health insurance that covers cost of ambulatory or outpatient treatment.
3. Documentation of professional liability insurance.
4. Documentation of an approved CPR certification which is kept current throughout the program.
5. Documentation of Hepatitis B vaccination or signed release form.

Degree Requirements
Students may follow one of two plans for their program of study: (1) Plan I: Thesis, or (2) Plan II: Professional Paper. Requirements for completion of the program in Plan I are a minimum of 47 semester hours of graduate coursework for students enrolled in the Adult Acute
Care track, and a minimum of 50 semester hours for those enrolled in the Family Nurse Practitioner track, and a minimum of 47 semester hours for those enrolled in the Home Health Care track. Requirements for completion of the program in Plan II are a minimum of 51 semester hours of graduate coursework for students enrolled in the Adult Acute Care track and a minimum of 48 semester hours for those enrolled in the Family Nurse Practitioner track; and a minimum of 52 semester hours for the Home Health Care track. Both plans also require that all students successfully complete a written comprehensive examination before progressing to the oral exam.

Financial Aid

Financial aid for graduate students in the College of Nursing comes primarily from the following sources:

1. Alabama Board of Nursing Scholarships.
   Fifteen scholarships are granted each year to graduate students attending schools in Alabama. Funding is $3,800 for full-time study for one year or $950 per term for one year. Students must make application directly to the Alabama Board of Nursing by June 1 of each year.

   The College of Nursing applies annually for a limited number of traineeships for graduate students. These funds are granted to students enrolled for full-time study in the program. Application forms may be obtained through the Office of Financial Aid or the Office of the Director of the graduate program in Nursing.

3. Elizabeth M. Fisher Memorial Scholarship.

4. Graduate Teaching Assistantships.

5. Graduate Tuition Scholarships.

Nursing Tracks

Core Requirements: Semester Hours

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development of Nursing Theory (NUR 601)</td>
<td>3</td>
</tr>
<tr>
<td>Graduate Statistical Analysis (NUR 605)</td>
<td>4</td>
</tr>
<tr>
<td>Seminar in Research (NUR 602)</td>
<td>3</td>
</tr>
<tr>
<td>Advanced Health Assessment (NUR 606)</td>
<td>3</td>
</tr>
<tr>
<td>Pathophysiology (NUR 612)</td>
<td>4</td>
</tr>
<tr>
<td>Family Nursing (NUR 627)</td>
<td>5</td>
</tr>
<tr>
<td>Professional Practice Issues (NUR 641)</td>
<td>2</td>
</tr>
</tbody>
</table>

Adult Acute Care Track

In addition to the above 24 semester hours of required core courses, student selects one of the three following options:

Option I: Adult Acute Care with Teaching Role Development

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Care Nursing (NUR 631, 632)</td>
<td>8</td>
</tr>
<tr>
<td>Teaching Support Courses (NUR 634, 635)</td>
<td>6</td>
</tr>
<tr>
<td>Teaching Practicum (NUR 637)</td>
<td>3</td>
</tr>
</tbody>
</table>

17

OR

Option II: Adult Acute Care with Supervision Role Development

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Care Nursing (NUR 631, 632)</td>
<td>8</td>
</tr>
<tr>
<td>Supervision Support Course (MGT 621, 622, 623 or 624)</td>
<td>3</td>
</tr>
</tbody>
</table>

270
Nursing Management (NUR 633) ................................................................. 3
Supervision Practicum (NUR 636) ................................................................. 3

OR

Option III: Adult Care with Home Health Administration Role Development
Acute Care Nursing (NUR 631, 632) ................................................................. 8
Home Health Support Courses (NUR 607, 608) ........................................... 6
Home Health Practicum (NUR 644) ................................................................. 3

17

The remaining 6-10 hours required are selected on the basis of a thesis (Plan I) for a minimum of six semester hours, or a professional paper (Plan II) for a minimum of 4 semester hours plus six hours of electives. A minimum of 47 semester hours is required for the program in Adult Acute Care nursing.

Family Nurse Practitioner Track
In addition to the above 24 semester hours of required core courses, student completes the following 24-26 semester hours of course work if enrolled in the family nurse practitioner track:
Role Socialization (NUR 640) ................................................................. 2
Community Nursing (NUR 628, 629, 630) .................................................... 15
Pharmacology in Advanced Practice (NUR 614) ............................................ 3
Professional Paper (NUR 603) ................................................................. 4

OR
Thesis (NUR 699) .................................................................................. 6

24-26

A minimum of 48 semester hours is required in the program preparing family nurse practitioners.

Home Health Care Track
In addition to the above 24 semester hours of required core courses, student completes the following 24-28 semester hours of course work if enrolled in the home health care track:
Home Health Care Nursing (NUR 642, 643, 644) ........................................ 11
Home Health Care Support Courses (NUR 607, 608) .................................... 6

17

The remaining 6-10 hours required are selected on the basis of a thesis (Plan I) for a minimum of six semester hours, or a professional paper (Plan II) for a minimum of 4 semester hours plus six semester hours of electives. A minimum of 47 semester hours is required in the program preparing students with a clinical major in Home Health Care Nursing.

Graduate Nursing Courses (NUR)
500 Special Topics 2-4 hrs.
Advanced study of underlying sciences and personal experiences in application of skills in selected area of interest in nursing. Elective. Prerequisite: approval of instructor.
601 Development of Nursing Theory 3 hrs.

602 Seminar in Research 3 hrs.
Identification, exploration, and critique of current nursing theory and research to encourage student to think critically. Use of theory and scientific methodology to formulate a proposal for investigation or research. Lab Fee: Level 2.

603 Professional Paper 4 hrs.
Application of research or investigative process with faculty guidance. Research or investigation of a nursing problem and preparation of appropriate written report. Minimum of four hours required. Prerequisites: NUR 602, 605, 627.

605 Graduate Statistical Analysis 4 hrs.
Theory and application of statistical tests of association, relationship and differences including descriptive statistics and regression analysis. Use of personal computers and SYSTAT statistical software will be required. Prerequisite: NUR 602. Lab Fee: Level 5.

606 Advanced Health Assessment 3 hrs.
Theory and laboratory practice to develop skills for comprehensive health assessment of individuals and families. Lab fee: Level 7.

607 Home Health Theory and Issues 3 hrs.
Overview of current and emerging issues in home health care. Emphasis will be given to the social, economic, legislative and technological forces influencing changes in health and home care delivery systems. Lab Fee: Level 2.

608 Case Management in Home Health Nursing 3 hrs.
Extensive analysis of home health care delivery systems with emphasis on planning, implementing, coordinating and evaluating care of clients in the home environment. The course will include an introduction to the use of computer software for fiscal and personnel management. Prerequisites: NUR 607; NUR 631 or 642. Lab Fee: Level 2.

612 Pathophysiology 4 hrs.
Expansion upon previous knowledge of anatomy, physiology, adaptation, and disease process. Anticipated and existing physiological alterations as they affect the individual and the family. Lab Fee: Level 1.

614 Pharmacology in Advanced Practice 3 hrs.
Advanced content in clinical pharmacology based on body systems and the physiological-biochemical relations with and between those systems. Prerequisite: NUR 612. Lab Fee: Level 1.

627 Family Nursing 5 hrs.
Advanced nursing concepts and clinical practice of health management of families in primary, secondary and tertiary health care needs. Lab fee: Level 8. Prerequisites: NUR 601, 606.

628 Family Nurse Practitioner I. 4 hrs.
Advanced nursing concepts and clinical practice of health management of women throughout the life span in context of the family. Required for students selecting family nurse practitioner track. Lab fee: Level 8. Prerequisite: NUR 612, 627.

629 Family Nurse Practitioner II 4 hrs.

630 Family Nurse Practitioner III 7 hrs.
Seminar and clinical practicum utilizing innovative nursing management for families with complex problems. Lab fee: Level 8. Prerequisite: NUR 629.
631 Family Nursing in Acute Care I 4 hrs.

632 Family Nursing in Acute Care II 4 hrs.
Continuation of concepts and clinical practice begun in NUR 631. Lab fee: Level 8. Prerequisite: NUR 631.

633 Management Theory for Advanced Nursing Practice 3 hrs.
Selected topics are explored to increase knowledge of management theory related to preparation of nursing supervisors. Includes decision making, performance appraisals, resource and risk management, and politics of management and labor relations. Prerequisites: MGT 621, 622, 623, or 624. Lab Fee: Level 1.

634 Curriculum Development in Nursing 3 hrs.
Theories and concepts of contemporary curriculum development and program evaluation in associate and baccalaureate nursing programs. Lab Fee: Level 1.

635 Teaching and Evaluation in Nursing 3 hrs.
Teaching strategies applicable to basic nursing education including process of formative and summative evaluation. Prerequisite: NUR 634. Lab Fee: Level 1.

636 Practicum in Supervision 3 hrs.
Practicum in planning, directing and evaluating activities of nursing personnel in selected health care settings. Lab fee: Level 7. Prerequisites: NUR 633.

637 Practicum in Teaching 3 hrs.
Practicum in planning and teaching nursing to selected student groups at the associate and baccalaureate degree levels. Lab fee: Level 7. Prerequisite: NUR 635.

640 Concepts of Role Socialization 2 hrs.
Seminar in leadership skills and role socialization to enhance effectiveness of master's prepared family nurse practitioner students. Lab Fee: Level 1.

641 Issues in Professional Practice 2 hrs.
Exploration of professional nursing’s development and related social, political, and technological forces. Strategies for management and change are identified and evaluated. Prerequisite: NUR 629, 632, or 643. Lab Fee: Level 1.

642 Home Health Care Nursing I 4 hrs.
Clinical course which focuses on chronically ill children and adults requiring hospitalization and intensive nursing care. Required for students selecting home health clinical track. Lab Fee: Level 8. Prerequisite: NUR 627, 607.

643 Home Health Care Nursing II 4 hrs.
Clinical course providing students with initial experience in home health care agencies. Students will be introduced to overall coordination activities related to case management. Lab fee: Level 8. Prerequisites: NUR 607, 642.

644 Home Health Care Administrative Practicum 3 hrs.
Practicum providing students with opportunity to practice leadership and administrative skill within the context of home health and under the direct preceptorship of home health nursing administrators. Lab fee: Level 8. Prerequisites: NUR 608; NUR 632 or 643.

645 Practicum in Teaching 3 hrs.
Practicum in planning and teaching nursing to selected student groups at the associate and baccalaureate degree levels. Lab fee: Level 7. Prerequisite: NUR 635.

650 Independent Study 2-4 hrs.
The planning, implementation, and evaluation of related phenomena of special interest observed in nursing practice. Prerequisite: Dean’s approval.

699 Thesis 6 hrs.
Independent research investigation related to practice of nursing under faculty guidance. Minimum of six hours required. Prerequisites: NUR 602, 627.
Realizing that the acquisition of scientific knowledge and expertise is not only a profession but also a vital support to other disciplines, the College of Science offers programs designed to meet various educational, vocational and professional goals. Students may select programs of study for career opportunities in mathematical, life, and physical sciences or as background requirements for professional studies in medicine, engineering and education. In addition, the faculty assists students in preparation for advanced studies and in planning research projects to enhance course work. By encouraging intellectual as well as technical development, the faculty seeks to introduce students to scientific inquiry as an orderly thought process.

The College of Science consists of five academic departments: Biological Sciences, Chemistry, Computer Science, Mathematical Sciences, and Physics. Programs are administered by these five departments and the Office of the Dean. The Optical Science degree is administered through the Physics Department. Specific departmental degree requirements along with course descriptions are listed in the sections that follow.

Undergraduate Degrees and Study
The College of Science awards the Bachelor of Science and the Bachelor of Arts Degree. Majors are offered in biological sciences, chemistry, computer science, mathematics, mathematics education, optical science, and physics. A certificate program in environmental science is offered to undergraduates majoring in sciences or mathematics and to graduates with these majors. In addition, courses are offered in atmospheric science and statistics.

Specific degree programs include:

<table>
<thead>
<tr>
<th>Atmospheric and Environmental Science</th>
<th>Certificate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences</td>
<td>B.S., B.A.</td>
</tr>
<tr>
<td>Chemistry</td>
<td>B.S.</td>
</tr>
<tr>
<td>Computer Science</td>
<td>B.S.</td>
</tr>
<tr>
<td>Mathematics</td>
<td>B.S., B.A.</td>
</tr>
<tr>
<td>Mathematics Education</td>
<td>B.S., B.A.</td>
</tr>
<tr>
<td>Optical Science</td>
<td>B.S.</td>
</tr>
<tr>
<td>Physics</td>
<td>B.S.</td>
</tr>
</tbody>
</table>

Junior College Work (After 64 Semester Hours)
After a student majoring in the College has earned more than 64 semester hours of credit (UAH plus transfer), course work taken at a junior college will normally not be accepted for transfer. Exceptions to this policy must be approved prior to taking additional course work. Requests for exceptions must be in writing and approved by the UAH chairperson of the department where the course is taught, and by the Dean of Science.

275
Health and Physical Education Courses

Students who major in the College may count up to three semester hours of health and physical education courses toward their requirements for graduation.

Graduate Degrees and Study

The College of Science offers graduate programs which lead to the Master of Science degree in biological sciences, chemistry, computer science, mathematics, and physics and to the Master of Arts in mathematics. Doctoral programs are offered in applied mathematics, computer science, materials science and physics. The Ph.D. will begin in the Atmospheric Science Program in the fall of 1990. The Doctor of Philosophy degree in chemistry is available through a cooperative program with the University of Alabama, Tuscaloosa. A certificate in environmental science is available in conjunction with graduate degrees in science and mathematics, and a significant number of graduate courses are offered in biochemistry and optical science.

While the College of Science does not directly prepare students for professional degrees, provisions are available for public school teachers who wish to concentrate in the sciences while pursuing graduate professional degrees in education. In addition to the usual class A (master’s level) certification, a Non-Traditional Fifth Year Program (NTFYP) is available for individuals who already have a B.A. or B.S. degree with a major in Biological Sciences, Chemistry, Mathematics, or Physics but who do not already have the Class B (bachelor’s level) certification. Individuals interested in obtaining Class A (master’s level) certification through the NTFYP should contact the Education Department and also see the Education section in this catalog.

In formulating a strategic mission for the College, we continue to emphasize basic research while exploring every opportunity to strengthen our ties with production segments in the government and private sectors. Our strength lies in our ability to freely explore and investigate new and promising ideas. The College takes advantage of its strategic location in the midst of the heavy concentration of high technology-oriented private and government industries of the Tennessee Valley. In this regard, we offer unique opportunities for original investigations at the forefront of science and technology, including problems which are of direct interest to industry as well as to basic academic research. Dissertation and thesis work may be undertaken in areas where numerous opportunities exist for testing theoretical models under experimental conditions. In several graduate program areas there is a close working relationship with the College of Engineering.

Atmospheric and Environmental Science Program

Research Professors Essenwanger, Vaughan; Associate Professors Kidder (Director), Modlin, McNider.

Undergraduate Program

Atmospheric and Environmental science courses are taken for several purposes: as a minor, to earn an environmental science certificate, as part of a composite major, and as electives. The certificate program is designed to prepare scientists, mathematicians, and engineers to solve problems relating to man’s interaction with the natural environment. The certificate is a supplement to the bachelor’s degree and signifies that the holder has broadened his perception of the physical and organic environment by studying the entire spectrum of natural science (atmosphere, biosphere, hydrosphere, and lithosphere), and by specializing in environmental aspects of his field.

Many courses necessary to earn the certificate are automatically taken as part of the student’s major or his GER. Other required courses can be taken as electives, permitting the fully prepared bachelor’s candidate to complete requirements for his degree and the certificate with the usual number of credit hours required for the bachelor’s degree alone.
### Composite Major in Environmental and Biological Sciences

<table>
<thead>
<tr>
<th>Course Type</th>
<th>Course Details</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GER</td>
<td>(humanities and social sciences, ECN or PSC recommended)</td>
<td>36</td>
</tr>
<tr>
<td>Mathematics</td>
<td>(including ST 281 if Level III placement)</td>
<td>9</td>
</tr>
<tr>
<td>Physics</td>
<td>Ph 101, 102 or 111, 112</td>
<td>8</td>
</tr>
<tr>
<td>Chemistry</td>
<td>CH 121, 123, 125, 126, 223, 331, 332, 335, 361, 362</td>
<td>22</td>
</tr>
<tr>
<td>Environmental Science</td>
<td>ES 101, 102 or 202, 303 or 304, 312, 321</td>
<td>17</td>
</tr>
<tr>
<td>Biological Sciences</td>
<td>BYS 113, 114, 221, 312, 319, and MS 507, BYS 531 or BYS 561</td>
<td>23</td>
</tr>
<tr>
<td>BYS electives</td>
<td></td>
<td>12-14</td>
</tr>
<tr>
<td>One from</td>
<td>315, 317, 378</td>
<td>4-5</td>
</tr>
<tr>
<td>One from</td>
<td>562, 563, 564</td>
<td>4</td>
</tr>
<tr>
<td>Computer Science</td>
<td>CS 108</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>(to include statistics if not MA Level III placement)</td>
<td>0-3</td>
</tr>
</tbody>
</table>

### Requirements for the Environmental Science Certificate

Basic science courses (unless exempted by advanced placement and/or testing in each case):
- Biological Sciences 113, 114
- Chemistry 121, 123, 125, 126
- Environmental Science 101, 102
- Physics 111, 112
- Two basic courses in statistics and/or computer science.

Environmental certificate core courses:
- BYS 312 Principles of Ecology
- ES 321 Pollution Problems
- ES 521 Environmental Data Analysis

Advanced level specialization (9 hours required in courses in student’s major or area of interest chosen from the following):
- BYS 526 Microbial Ecology
- BYS 561 Physiological Ecology
- BYS 562 Community Ecology
- BYS 563 Population Ecology
- BYS 564 Limnology
- MS 502 Marine Geology
- MS 509 Marine Ecology
- MS 510 Marsh Ecology
- CH 525 Environmental Chemistry
- ISE 422 Systems Analysis
- ISE 427 Management Science
- ISE 524 Introduction to Human Engineering
- ME 549 Environmental Engineering
- ME 559 Selected Topics in Mechanical Engineering
- ES 303 Climatology
- ES 304 Meterology
- ES 305 Hydrology
- ES 593 Directed Studies in Environmental Science

### Requirements for a Minor in Atmospheric and Environmental Science

A student in any area of study may build a minor in atmospheric and environmental science with approval of the advisor in his department. A minor is tailored to the student’s needs through consultation with the department advisor and the Atmospheric and Environmental Science Coordinator.
Atmospheric and Environmental Science (ES)

100 Introduction to Space Science 1 hr.
Introduction to a variety of space science subjects. Included are lectures on space physiology, computer systems, materials science, robotics in space, thermodynamics, astrophysics, and solar physics. Laboratory experiments and simulated missions are also part of the course. This course is offered in cooperation with the Alabama Space and Rocket Center and is open only to students enrolled in Space Academy II.

101 Planetary and Atmospheric Science I 4 hrs.
Spatial relationships of earth, moon and sun that determine earth motions, seasons, atmospheric and oceanic circulation, weather and climates. Practical and field work. Lab fee: Level 4. Prerequisite: MA 105.

102 Planetary and Atmospheric Science II 4 hrs.
Introduction to physical geology. Minerals and rocks, geologic time, mountain building, seismic and earth’s interior, continental drift and plate tectonics, weathering and erosion. Lab fee: Level 4. Prerequisite: ES 101 or approval of instructor.

202 Physical Geology 3 hrs.
Igneous processes, minerals, rocks, rock alterations and sediments, tectonic processes and continental evolution; soil classification, climate; fluvial, desert and glacialization landforms; river flooding, coastal hazards, geologic aspects of waste disposal and environmental hazards. Prerequisites: ES 102, CH 101.

303 Classification and Physical Causes of Climates 3 hrs.
Basic atmospheric structure and physical processes, climate history and climate change, microclimates, topoclimates. Prerequisites: ES 101, MA 105 or approval of instructor.

304 Meteorology 3 hrs.
Physical properties and dynamics of atmosphere, factors that govern weather conditions, meteorological factors affecting design and operation of aircraft, and weather research. Prerequisites: ES 201 and MA 151 or MA 154 or approval of instructor.

305 Hydrology 3 hrs.
Movement and behavior of surface and groundwater, interaction with geological structures, hydrologic prediction, contamination and purification of groundwater. Prerequisite: ES 202.

312 Principles of Ecology 4 hrs.
Ecological principles controlling plant and animal populations. Development of ecosystems, communities and habitats. One 4 hour lab a week. Field trips required. Lab fee: Level 4. Prerequisites: BYS 113, 114, CH 101 (121); BYS 238 desirable.

321 Pollution Problems 3 hrs.
Quantitative descriptions of environmental conditions, regulations, and abatement technology. Specific pollution problems with air, water, noise, and radiation; assessment of environmental impacts of development or construction projects. Prerequisites: sophomore standing and approval of instructor.

490 Selected Topics in Environmental Science 1-3 hrs.
Special offerings to students in areas of interest not covered in present curriculum. Prerequisite: Approval of instructor. Lab fee: Level 4.
Graduate Program

The Atmospheric and Environmental Science graduate program is instituted to provide a series of courses which can be used to develop a coherent minor or area of specialty under M.S. and Ph.D. degree programs in Science, Mathematical Sciences, and Engineering. The Ph.D. program in Atmospheric Science began in the fall of 1990. The program is designed to allow students pursuing advanced degrees in the above programs to obtain the necessary background to successfully pursue research topics in atmospheric and environmental science. Research in atmospheric science now ongoing at UAH in academic departments and research centers coupled with excellent atmospheric research facilities at NASA's Marshall Space Flight Center allows students to be involved in state-of-the-science research in atmospheric and environmental science.

512 Environmental Transport 3 hrs.

521 Environmental Data Management and Analysis 3 hrs.
Overview of computer hardware, software, communications, and terminals. Management information systems, overview of techniques of data archival and retrieval. Introduction to graphical and image analysis systems. Prerequisites: Computer programming and statistics.

525 Environmental Chemistry 3 hrs.
Principles of quantitative analyses related to minor components of a sample. Applications selected from principal analyses necessary to maintain environmental quality of air, water, and soil. Selection of conditions for collecting reliable samples, concentration of components with techniques for increasing concentration of selected component, relationships between physical and chemical changes in sample and signal output of predominant transducers, and translation of chemical analysis into meaningful specifications. Lecture only. Prerequisite: CH 521 or 123; EG 311, 342. (Same as CH 525).

532 Space Orientation for Teachers: Science 3 hrs.
This course introduces the teacher to a variety of space-related subjects and techniques which may be used in the classroom. The curriculum is designed to reflect current research and technological development in a hands-on experience with the space program. It will include a number of experiments which can be duplicated in the classroom. Offered in cooperation with the Alabama Space and Rocket Center.

551 Atmospheric Fluid Dynamics (same as ME 551) 3 hrs.
A study of fluid dynamics in the atmosphere. Coriolis acceleration, scale analysis and appropriate approximations of the complete governing equations. Numerical analysis and interpretation of weather phenomena. Prerequisites: MA 352, ME 341, ME 352 or equivalent.

553 Atmospheric Radiation (same as ME 553) 3 hrs.

581 Atmospheric Thermodynamics (same as ME 581) 3 hrs.
An introduction to thermodynamics of the atmosphere and relation to weather phenomena. Review first and second law, special atmospheric thermodynamics.
variables, treatment of air-water systems, atmospheric thermodynamic diagrams, atmospheric statics and vertical stability. Prerequisites: MA 352, PH 321 or ME 341.

591 Environmental Quality Planning 3 hrs.
593 Directed Studies in Atmospheric and Environmental Science 1-4 hrs.
Supervised compilation, summarization, and discussions of special topics in atmospheric and environmental science.

594 Cultural Resources 2 hrs.
595 Aesthetic Resources 2 hrs.
632 Space Orientation for Teachers: Science 3 hrs.
The curriculum for this program will build on that already attained by those educators who have participated in the generic program conducted at UAH, by providing educational experiences available in Washington, D.C. These will occur at the National Air and Space Museum, Goddard Space Flight Center, Owens Science Center (Challenger Center), Maryland Science Center, U.S. Naval Observatory, Space Telescope Science Institute at Johns Hopkins, National Oceanic and Atmospheric Administration, and the Office of Technology Assessment. Prerequisite: ES 532. (Same as ED 632).

643 Atmospheric Boundary Layers 3 hrs.
Operational characteristics of lasers or other optical devices in the atmosphere are dependent upon the turbulent structure of the atmosphere. In addition, the optical interference of smoke and dust is dependent upon both absolute and relative turbulent dispersion of the aerosols. Topics to be covered: structure of convective and stable boundary layers, similarity methods, turbulent intensity and scale, relative-two particle dispersion, absolute-single particle dispersion, Gaussian and statistical models. Prerequisites: ME 551 or ES 551.

653 Atmospheric Optics 3 hrs.
Operational characteristics of optical or other radiative devices depend upon the radiative properties of the atmosphere-scattering, absorption, refraction, etc. Topics to be covered: Distribution and properties of atmosphere aerosols and gases, condensation and haze state, refraction of light by air, crystals and water drops, Raleigh scattering, Mie scattering, visibility, air mass optical characteristics. Prerequisites: ES 553, PH 541.

663 Advanced Topics in Atmospheric Science 1-3 hrs.
To include Satellite and Radar Meteorology and Numerical Atmospheric Modeling.

681 Numerical Atmospheric Modeling 3 hrs.
Introduction to numerical methods applied to simulation of the atmosphere. Filtering radiative parameterization, thermodynamics, turbulent parameterization, initialization, coordinate transformation. Prerequisite: MA 415, ES 551.

Biological Sciences Department

Professors Campbell, Dimopoullos, Wilson, Young; Associate Research Professor Van Alstine; Associate Professors Eley, Garstka (Interim Chair), Lawton, Modlin, Moriarity; Assistant Professors Johnson, Lewis, Mikell.

Undergraduate Programs

A student may elect a program leading to either a Bachelor of Arts or a Bachelor of Science degree. In most areas of biological interest, a Bachelor of Science degree is deemed more desirable; however, a Bachelor of Arts degree may be preferred in Programs of Study relating biological sciences to some of the humanities, social sciences, and economics.

280
Biological Science Major

The biological sciences program must include BYS 112, 113, and 114 or the equivalent. Only one of these may count toward the major; the other two are needed to satisfy a portion of the general education requirements (GER). A major in biological sciences includes the following core courses:

a. One course in anatomy and physiology chosen from the following: BYS 313/314, 315, 317, 371, 372, 378, 544, or 571.

b. One course in physiology chosen from the following: BYS 313/314, 435, 531, 532, or 561.

c. General genetics (BYS 319)

d. One course in biochemistry, which may be included in major or minor as BYS or CH.

BYS 313 or 314 each can satisfy only the anatomy or the physiology requirement. BYS 313 and 314 together can meet both the anatomy and physiology core requirements. BYS 492 is required for students in curricula preparatory for graduate study. Additional hours elected to constitute the minimum of 26 semester hours above the 100 level that are required for a major in biological sciences may be taken in accordance with the individual student’s goal.

Curricula are available for students who elect premedical technology, preprofessional, graduate preparatory, environmental science, or secondary education programs. Curricula I-XI are offered as models of appropriate programs to fulfill the University’s degree requirements and achieve diverse goals in the biological sciences with related areas of emphasis. Any curriculum may be modified to fit individual aims with approval of the biology faculty.

All B.S. degree programs in biological sciences include 8 semester hours of physics (PH 101/102, or 111/112 required for certain programs), CH 113 or 331, CH 223, one biochemistry course in the major or minor, and 3 semester hours of Level III mathematics including at least one calculus course. Biological science majors should take at least one course in statistics, which may be required in certain programs.

Biological Science Minor

A minor in biological sciences consists of 21 semester hours that include BYS 112, 113 (or 114), and 319 with at least 6 hours numbered 300 or above. Additionally, CH 101, 105, and 113 are required ancillary courses for a biological sciences minor. A course in biochemistry (BYS or CH 301) supports the minor but is not required.

Curriculum I

B.A. degree appropriate for biological sciences major with an associated minor in social sciences.

<table>
<thead>
<tr>
<th>Category</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GER (humanities and social sciences)</td>
<td>36-42</td>
</tr>
<tr>
<td>Biological sciences core courses and biological sciences electives</td>
<td>30-32</td>
</tr>
<tr>
<td>Chemistry (101, 105, 113, or 331, 301)</td>
<td>8-11</td>
</tr>
<tr>
<td>Physics</td>
<td>8</td>
</tr>
<tr>
<td>Mathematics</td>
<td>3-6</td>
</tr>
<tr>
<td>Humanities, social sciences, economics, or associated cluster</td>
<td>21</td>
</tr>
<tr>
<td>Electives</td>
<td>27-30</td>
</tr>
</tbody>
</table>
Curriculum II
B.A. or B.S. degree with a major in Biological Sciences. This plan meets requirements for an Alabama Class B High School Teachers Certificate.

Semester Hours
<table>
<thead>
<tr>
<th>Course Description</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GER (humanities and social sciences)</td>
<td>36-42</td>
</tr>
<tr>
<td>Biological Sciences core courses and electives to include BYS 312</td>
<td>30-36</td>
</tr>
<tr>
<td>Chemistry (to include CH 113, or 331, and 361, depending on B.A. or B.S.)</td>
<td>8-22</td>
</tr>
<tr>
<td>Mathematics (depending on placement and B.A. or B.S.)</td>
<td>3-9</td>
</tr>
<tr>
<td>Physics — PH 101 and 102 (depending on B.A. or B.S.)</td>
<td>4-8</td>
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<td>27</td>
</tr>
<tr>
<td>Professional Education Courses</td>
<td>33</td>
</tr>
</tbody>
</table>

NOTES:
1. This curriculum may require more than the minimum 128 total semester hours.
2. Students considering this curriculum should consult the Department of Education early in their program.
3. A GENERAL SCIENCES COMPOSITE MAJOR covering the areas of chemistry, biological sciences, environmental sciences and physical sciences is possible under this curriculum. Interested students should consult the Biological Sciences or Education Departments.

Curriculum III
B.S. degree with emphasis in Biochemistry.

Semester Hours
<table>
<thead>
<tr>
<th>Course Description</th>
<th>Hours</th>
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<tbody>
<tr>
<td>GER (humanities and social sciences)</td>
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</tr>
<tr>
<td>Biological sciences core courses and BYS 221, 361, 362, 363, 364, 519, and 543</td>
<td>45-47</td>
</tr>
<tr>
<td>Chemistry — CH 121, 123, 125, 126, 223, 331, 332, 333, 335, 336, (347 and 345 desirable)</td>
<td>21-25</td>
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<tr>
<td>Mathematics — MA 153, 154</td>
<td>6</td>
</tr>
<tr>
<td>Physics — PH 111, 112</td>
<td>8</td>
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Curriculum IV
B.S. degree with chemistry minor, preparatory for graduate study.

Semester Hours
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<tr>
<th>Course Description</th>
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<tbody>
<tr>
<td>GER (humanities and social sciences)</td>
<td>36-42</td>
</tr>
<tr>
<td>Biological sciences core courses and biological sciences electives</td>
<td>30-32</td>
</tr>
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<td>Chemistry — CH 121, 123, 125, 126, 223, 331, 332, 335, 361, 362</td>
<td>22</td>
</tr>
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<td>Physics — PH 101, 102, (PH 111, 112 may be taken)</td>
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<tr>
<td>Electives</td>
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**Curriculum V**

B.S. degree with physics-chemistry cognate studies, preparatory for graduate study.

<table>
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<td>GER (humanities and social sciences)</td>
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<tr>
<td>Biological sciences core courses and biological sciences electives</td>
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<tr>
<td>Chemistry — CH 121, 123, 125, 126, 331, 332, 335, 361, 362</td>
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<td>Mathematics — (depending on placement)</td>
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<td>Physics — PH 111, 112, 201, 241, 331, 351</td>
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**Curriculum VI**

B.S. degree, premedical, predental, preveterinary. (See chemistry section for an alternate premedical curriculum.)

<table>
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<td>Chemistry — CH 121, 123, 125, 126, 223, 331, 332, 333, 335, 336 (341 desirable)</td>
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<td>Electives</td>
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**Curriculum VII**

B.S. degree, microbiology emphasis, preparatory for: (a) the National Registry of Microbiologist Examination for Registered Microbiologists with the American Academy of Microbiology; (b) graduate study in microbiology.

<table>
<thead>
<tr>
<th>Courses</th>
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<td>Physics — 101, 102, or 111, 112</td>
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**Curriculum VIII**

B.S. degree, medical technology emphasis, preparatory for the Medical Technologist certification examinations of the National Certification Agency for Medical Laboratory Personnel and the Board of Registry of the American Society of Clinical Pathologists. This curriculum satisfies academic requirements for a B.S. in Biological Sciences with a Medical Technology emphasis. It is offered with the cooperating clinical laboratories in Huntsville and the School of Health Related Professions at the University of Alabama at Birmingham (UAB). The degree program is accomplished in three phases: (I) Completion of academic prerequisite courses during the preclinical phase at UAH, (II) Completion of Medical Technology courses at UAB during Summer, Fall and Winter Terms, with the transfer of credits back to UAH, and (III) Completion of Clinical Practice courses at the cooperating clinical laboratories in Huntsville during
the Spring and Summer Terms, with transfer of credits to UAH. Upon satisfactory completion of these three phases of the program, the BS degree in Biological Sciences with emphasis in Medical Technology is awarded by the University of Alabama in Huntsville. The candidate is then eligible to apply for certification as a medical technologist. Enrollment in the UAH phase does not automatically grant admission to the UAB phase; however, a student who has earned a UAH grade point average of 2.5 or better, has earned a C or better in all BYS and CH courses, and has been recommended by the Chairperson of the Department of Biological Sciences will automatically be accepted into the UAB phase upon application. The application deadline is January 15. Applications received after January 15 are considered on a space available basis. The three phases of the curriculum are outlined below. Students must consult with an advisor during their first semester at UAH.

### Phase I, UAH

<table>
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<th>Course</th>
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### Phase II, UAB (see UAB catalog for course descriptions)

#### Summer

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<td>MT 301 Lab Math</td>
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<td>MT 302 Urinalysis</td>
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<td>MT 320 Clinical Chemistry I</td>
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<td>MT 325 Clinical Immunology</td>
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<tr>
<td>MT 335 Clinical Myology/Parasitology</td>
<td>3</td>
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<td>MT 336 Clinical Microbiology</td>
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<td>MT 402 Hemostasis</td>
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### Phase III, Cooperating Clinical Laboratories in Huntsville

#### Spring and Summer

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<td>MT 406 Laboratory Management II</td>
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MT 407 Chemistry Clinical Practice .......................................... .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. 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One from 315, 317, 378.........................................................4-5
One from 562, 563, 564.........................................................4
One from 364, 371, 372.........................................................4-5
Computer science — CS 108..................................................3
Free electives (to include statistics if not MA)
Level III placement) ..........................................................0-3

Courses in Marine Sciences

Select courses in marine sciences, available through the Marine Environmental Sciences Consortium, may be taken for credit at UAH toward a biological science major or minor, a minor in marine sciences, or a Master of Science degree in biological science. Biological science majors electing a marine science minor generally would not take MS courses in the minor that were principally biological oriented. Courses for which credit is not given for a biological science major or minor can be taken as electives. All programs of study that involve marine science courses must be approved by the MESC-UAH liaison officer.

Biological Science (BYS)

100 Introduction to Health Professions ........................................1 hr.
Career options for undergraduate students interested in health professions. Basics of health-care delivery systems and terminology of health care. Primarily for freshmen and sophomores. No BYS major or minor credit. (Same as MED 100).

112 General Biology ..........................................................4 hrs.
Introduction to biological principles: cellular and subcellular structure and function; introduction to biological chemistry and molecular biology including photosynthesis, glycolysis, Kreb’s cycle, protein and fatty acid synthesis; cell reproduction and gametogenesis (meiosis); principles and applications of Mendelian genetics; concepts of evolution; taxonomic principles in the classification of plants and animals. One lab per week. Lab fee: Level 4.

113 General Botany ..........................................................4 hrs.
Biological principles related to the Plant Kingdom; Cells, tissues and functional anatomy of plants. Prerequisite: BYS 112. One lab a week. Lab fee: Level 4.

114 General Zoology ..........................................................4 hrs.
Biological principles related to the Animal Kingdom; biological organization of animals; structure and function of musculo-skeletal, respiratory, cardiovascular, digestive, excretory, nervous and endocrine systems; homeostasis; reproduction and development; ecological principles; animal phylogeny. One lab per week. Prerequisite: BYS 112. Lab fee: Level 4.

214 Infection and Immunity ..................................................4 hrs.
Principles of microbiology with emphasis on infectious disease of humans; epidemiological and immunological aspects. No credit for students who have credit for BYS 221 or advanced microbiology courses. Prerequisites: BYS 114, CH 101. Two 2-hour labs a week. Lab fee: Level 5.

221 General Microbiology ..................................................4 hrs.
Cultivation and observation of microorganisms and their relation to foods, water, and industrial processes; environment and disease. Two 2-hour labs a week. Not recommended for students in School of Nursing. No credit for students who have completed BYS 214. Take no later than sophomore year. Prerequisites: BYS 112, 114; CH 101 or 121 or equivalents. Lab fee: Level 5.

286
238 Local Flora 2 hrs.
Laboratory course with basic taxonomical procedures and determination of local angiosperms, primarily dicots. Basics of classification techniques and process of speciation. Field trips required. Lab fee: Level 3.

301 Elementary Biochemistry 3 hrs.
Biochemistry and energetics of living cells, metabolism, structure and function of carbohydrates, lipids, proteins and nucleic acid. Enzymes, coenzymes, vitamins, blood, endocrine glands, DNA synthesis and gene expression, nutrition, drugs and biochemistry of specialized tissues. Prerequisites: BYS 114 and CH 113 or 123. (Same as CH 301.)

312 Principles of Ecology 4 hrs.
Ecological principles controlling plant and animal populations. Development of ecosystems, communities, and habitats. Prerequisites: BYS 112, 113, 114, CH 121. One four-hour lab a week. Lab fee: Level 4. Field trip required.

313 Anatomy and Physiology I 4 hrs.
Structure and function of the human body. Physiology and anatomy of major organs, organ systems, and their interactions. Not for students preparing for professional schools or graduate study in physiology or development. Prerequisites: BYS 114, CH 101, and 105 (CH 113 recommended). One lab a week. Lab fee: Level 5.

314 Anatomy and Physiology II 4 hrs.
Continuation of BYS 313 stressing structural and functional relationships of major organs, organ systems, and their interdependent regulation. Not for students preparing for professional schools or graduate study in physiology or development. Prerequisites: BYS 313, CH 101 and 105 (CH 113 recommended). One lab a week. Lab fee: Level 5.

315 Ichthyology 4 hrs.
Classification, anatomy, physiology, and ecology of freshwater and marine fishes. Emphasis on fishes of North Alabama. Laboratory and field trips required. Prerequisite: BYS 114. Lab fee: Level 4.

316 Vertebrate Zoology 5 hrs.
Morphology of vertebrate animals. Relationship of organs and systems and their phylogenetic significance. Prerequisite: BYS 114. Two three-hour labs a week. Lab fee: Level 5.

317 Vertebrate Reproduction 3 hrs.
General treatment of the major concepts and controversial areas of comparative vertebrate reproduction: ecological and evolutionary aspects, development of reproductive functions and sexual behavior, seasonal breeding and other topics of current interest. Prerequisite: BYS 114 or 313.

318 General Genetics 3 hrs.
Hereditary basis of all living organisms, including the study of (a) genes—the discrete nature of inheritance, (b) genes in organisms and (c) genes in populations. Mendelian principles and evolutionary processes. Includes replication, transcription and translation. Prerequisites: BYS 112 and CH 101 or equivalent.

320 Genetics Laboratory 1 hr.
Practical applications of modern genetic techniques. Prerequisite or concomitant: BYS 319. One 3-hour lab a week. Lab fee: Level 5.

340 Introduction to Cellular and Developmental Biology 4 hrs.
Modern approach to embryology relating cell structure and function to mechanisms involved in development. Prerequisites: BYS 112, CH 101, 105, 113, or 331. BYS 319 recommended. It is strongly recommended that biological science majors and preprofessional students take BYS 543, 544, and 545 instead of BYS 340. Two 2-hour laboratories per week. Lab fee: Level 5.
<table>
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<tr>
<th>Course Code</th>
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<tr>
<td>361</td>
<td>General Biochemistry</td>
<td>3 hrs.</td>
<td>Molecules that comprise living systems. Their nomenclature structure, properties, and functions in metabolism. Enzymatic properties and function, major and minor biosynthetic and catabolic pathways, their interrelations and control mechanisms. Glycolysis and gluconeogenesis, Kreb's cycle, photosynthesis and lipids, amino acids and proteins, and nucleic acids.</td>
<td>BYS 112, CH 332, and CH 335. (Same as CH 361).</td>
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<tr>
<td>362</td>
<td>General Biochemistry Laboratory</td>
<td>1 hr.</td>
<td>Practical experience in isolation, qualitative identification, and quantitative estimation of biomolecules. Prerequisite or parallel: CH 361. Prerequisite: CH 223. (Same as CH 362). One 4-hour lab a week. Lab fee: Level 6.</td>
<td>FCB 112</td>
<td></td>
</tr>
<tr>
<td>363</td>
<td>General Biochemistry II</td>
<td>3 hrs.</td>
<td>A continuation of BYS 361 to include biosynthesis of biomolecules, metabolism, DNA and RNA, the genetic code, protein biosynthesis, genes and molecular physiology. (Same as CH 363). Prerequisite: BYS 361.</td>
<td>BYS 361</td>
<td></td>
</tr>
<tr>
<td>364</td>
<td>Biogeography</td>
<td>3 hrs.</td>
<td>Principles of plant and animal distribution and dispersal, using the communities of North America as prime examples. Prerequisites: BYS 113, 114, 312 recommended.</td>
<td>FCB 113</td>
<td></td>
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<tr>
<td>365</td>
<td>General Biochemistry Laboratory II</td>
<td>1 hr.</td>
<td>An experimental course illustrating the topics in BYS 363. (Same as CH 364). Prerequisite: BYS 361 and BYS 362. Parallel BYS 363. Lab fee: Level 4.</td>
<td>FCB 113</td>
<td></td>
</tr>
<tr>
<td>371</td>
<td>Nonvascular Cryptogamic Botany</td>
<td>5 hrs.</td>
<td>Introduction to the biology of ray fungi, cellular and slime molds, fungi, algae, lichens, liverworts, hornworts, and mosses, emphasizing their ontogeny, structure, and phylogenetic lines of development. Prerequisite: BYS 113.</td>
<td>FCB 113</td>
<td>Level 5</td>
</tr>
<tr>
<td>372</td>
<td>Biology of Vascular Plants</td>
<td>5 hrs.</td>
<td>Comparative anatomy and morphology of vascular plants and their relationship in various phylogenetic lines of development. Vascular cryptogams as well as ferns, gymnosperms, and angiosperms. Not a field course. Prerequisite: BYS 113.</td>
<td>FCB 113</td>
<td>Level 4</td>
</tr>
<tr>
<td>378</td>
<td>Invertebrate Zoology</td>
<td>5 hrs.</td>
<td>Invertebrate phyla emphasizing anatomy, morphology, physiology, embryology, ecology, and phylogenetic relationships. Prerequisite: BYS 114. Two 3-hour labs a week. Lab fee: Level 5.</td>
<td>FCB 114</td>
<td>Level 5</td>
</tr>
<tr>
<td>421</td>
<td>Introduction to Medical Microbiology</td>
<td>5 hrs.</td>
<td>Medically significant microorganisms and their relation to human diseases. Bacterial, fungal, and viral agents and their properties, pathogenesis, and laboratory diagnosis. Prerequisites: BYS 221, BYS or CH 361, and BYS 430 recommended. Two 3-hour labs a week. Lab fee: Level 5.</td>
<td>FCB 221, BYS 319, and BYS/CH 361</td>
<td>Level 5</td>
</tr>
<tr>
<td>430</td>
<td>Immunology</td>
<td>4 hrs.</td>
<td>Basic course in immunology. Immunoglobulins, antigens, immune responses, complement, immediate and cell-mediated hypersensitivities, and transplantation and tumor immunology. Prerequisites: BYS 221. BYS 319 and BYS/CH 361 strongly recommended. One 4-hour lab a week. Lab fee: Level 5.</td>
<td>FCB 221</td>
<td>Level 5</td>
</tr>
<tr>
<td>435</td>
<td>Bacterial Physiology and Metabolism</td>
<td>4 hrs.</td>
<td>Aspects of bacterial physiology such as nutrition, growth, energy, and biosynthetic mechanisms of bacteria. Prerequisite: BYS 221. Biochemistry strongly recommended. One 4-hour lab a week. Lab fee: Level 5.</td>
<td>FCB 221</td>
<td>Level 5</td>
</tr>
</tbody>
</table>
436 Physiological Psychology 3 hrs.
Functional analysis of neural and endocrine systems underlying behavior. Prerequisites: (either a or b): (a) 15 hrs. of PY or approval of instructor; (b) BYS 114 or 313, and 6 hrs. of PY or approval of instructor. (Same as PY 436).

464 Evolution 3 hrs.

490 Special Topics in Biological Sciences 1-4 hrs.
Literature search relative to topics of special interest under direct supervision of instructor.

492 Undergraduate Research 2-4 hrs.
Individual investigations into biological problems under direct supervision of instructor. For advanced-level biological science students with biological science grade of 3.5 or above. May be taken at the Marine Environmental Sciences Consortium, Dauphin Island, Alabama. Prerequisite: approval of instructor. Lab fee: Level 3 for 2 hours, Level 4 for 3 hours, and Level 5 for 4 hours.

496, 497, 498, 499 Seminar 1 hr. each
Student discussions and presentations of biological literature from current library monographs and journals. Prerequisite: junior standing. Pass/fail grading. Biological sciences major requirement, one seminar. No more than 3 seminar credits can count in biological sciences major. May be taken at the Marine Environmental Sciences Consortium.

Graduate Program

The Department of Biological Sciences provides instruction, learning, and creative scholarly activities in the biological sciences. Scholarly investigations are undertaken by scientists and those who as graduate students (and sometimes advanced undergraduate students) undertake to become future scholars. The department does not offer courses in all areas of biological science; rather, it has chosen to emphasize instruction at the undergraduate and graduate levels in the following general areas:

1. cellular and developmental biology
2. microbiology
3. environmental biology
4. genetics and molecular biology

The graduate program is exceptional in at least two ways. First, the relatively small number of graduate students fosters an academic atmosphere stressing individuality and close interaction with the graduate faculty. Second, the graduate program is a cooperative venture with Alabama A&M University, with a combined faculty at both UAH and A&M of approximately 20. This arrangement provides a faculty resource and diversity of expertise available in large universities without sacrificing the close, personal supervision only small programs can accommodate.

Admission Requirements

In addition to fulfilling admission requirements set by the School of Graduate Studies, applicants must also:

1) show competence in an area of life science related to the proposed area of study;
2) complete one year of undergraduate chemistry, including at least one term of organic chemistry and biochemistry;

3) have a minimum GPA of 3.0 (A = 4.0) in the major area of concentration. A course in statistics is also recommended.

Degree Requirements
The graduate faculty, in cooperation with the Biology graduate faculty of Alabama A&M, offers an M.S. in Biological Sciences with emphasis in cell and developmental biology, ecology, genetics and molecular biology, microbiology, physiology, and systematics. A minimum of 25 percent of biological sciences course requirements must be met at the cooperating institution. A minimum of 50 percent of the graduate program must be taken at the 600 level.

Students may elect one of the following three plans:

Plan I – Master of Science With Thesis
a. Graduate course work of 24 semester hours of an approved program;
b. Comprehensive coursework examination;
c. Acceptable thesis describing original research; minimum of six hours BYS 699 required.
d. Final oral examination.

Plan II – Master of Science Without Thesis
a. Approved program of 33 semester hours;
b. Acceptable master's report (Library search, survey, and/or experimentation);
c. Comprehensive final examination.

Plan III – Master of Science With Education Option (Class A Certification)
a. Approved program of 24 semester hours in biological sciences and nine semester hours in education;
b. Acceptable master’s report;
c. Comprehensive final examination.

Non-Traditional Fifth-Year Program leading to the M.S. in Biological Sciences plus a Class A Alabama high school teachers certificate

Those who have a BA or BS degree with a major or its equivalent in Biological Sciences, as determined by the department of Biological Sciences, and have not taken more than 12 semester hours in teacher education (graduate or undergraduate), and who are interested in obtaining Class A (masters level) certification for secondary school teaching, should consider the Non-Traditional Fifth Year Program. Contact the Education Department for preliminary advisement on admission and general program requirements. See the description in the Education section for more details.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>519</td>
<td>Gene Structure and Function</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Molecular basis for inheritance and gene expression. Advanced studies of replication, transcription, translation. Includes regulation of gene expression, gene cloning and recombinant DNA technology. Prerequisites: BYS 319 and BYS/CH 361.</td>
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<tr>
<td>521</td>
<td>Medical Mycology (UAH)</td>
<td>4 hrs.</td>
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<td></td>
<td>Basic and applied studies of the various classes of fungi pathogenic to humans; reproduction, morphology, classification, classification of disease states, pathogenesis, laboratory diagnosis and chemotherapy. Prerequisite: BYS 421; BYS 430 is recommended. Two 2-hour labs per week. Lab fee: Level 4.</td>
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<tr>
<td>524</td>
<td>Mycology (UAH and A&amp;MU)</td>
<td>4 hrs.</td>
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<td></td>
<td>Lines of phycomycetes using representative species; various series of actinomycetes; representative pathogenic (crop and vegetative pathogens) and nonpathogenic heterobasidiomycetidae organisms; order and families of homobasidiomycetidae. Ontogenetics, cellular, and structural study applied to all divisions, classes, series, orders and families. Lab fee: Level 4.</td>
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<tr>
<td>525</td>
<td>Medical Parasitology (UAH)</td>
<td>5 hrs.</td>
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<td></td>
<td>Basic and applied studies of the various classes of parasites pathogenic to humans and their laboratory identification. Arthropods and their relationship as vectors of parasites. Immunology and chemotherapy of parasitism. Prerequisite: BYS 221 or equivalent. Two 2-hour labs per week. Lab fee: Level 3.</td>
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<tr>
<td>531</td>
<td>Plant Physiology (UAH)</td>
<td>4 hrs.</td>
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<td>A general introductory study of life processes of plants, including water relations, mineral utilization, metabolism, photosynthesis, digestion, respiration, assimilation, and growth as affected by growth hormones. Prerequisites: BYS 113, 371, or 372, CH 113 or 331. One 3-hour lab a week. Lab fee: Level 3.</td>
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<tr>
<td>532</td>
<td>Animal Physiology (UAH)</td>
<td>4 hrs.</td>
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<td></td>
<td>Basic course in organismal function. Membrane physiology with respect to transport phenomena, muscle, nerve, synapse, and sensory receptor physiology. Physiology of respiration, heart, circulation, kidney, and gastrointestinal tract as individual systems with emphasis on regulation. One laboratory session a week illustrating physiological principles discussed in lecture. Prerequisites: senior classification with a major or cluster in biological science; 16 hours completed in AOC and CH 113 or 331 or graduate standing. Lab fee: Level 4.</td>
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<tr>
<td>543</td>
<td>Cellular and Developmental Biology (UAH)</td>
<td>3 hrs.</td>
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<td>Cellular structure and function coupled with relevant aspects of developmental mechanisms. Lectures on mitosis, gametogenesis, nuclear-cytoplasmic interactions, role of genes in development, mechanisms of hormone action on cellular function and development and cell movements and affinities. Prerequisites: BYS 112, 114, 319, CH 101, 105, and 113 or CH 123, 126 and 331 (may be taken concomitantly).</td>
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<tr>
<td>544</td>
<td>Cellular and Developmental Biology (UAH)</td>
<td>3 hrs.</td>
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<td></td>
<td>Continuation of BYS 543 and selected morphogenesis of germ-layer derivatives. Prerequisite: BYS 543.</td>
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<tr>
<td>545</td>
<td>Cellular and Developmental Biology Laboratory (UAH)</td>
<td>2 hrs.</td>
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<td></td>
<td>Experimental techniques illustrating concepts of cellular, molecular and developmental biology. Take course after BYS 543 and concurrently with BYS 544. Lab fee: Level 5.</td>
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</tbody>
</table>
547 Biochemistry I (UAH) 3 hrs.
Structural chemistry and function of biomolecules, mechanisms of biochemical reactions, enzyme kinetics, and energy transfer. Prerequisite: CH 333 or CH or BYS 361. (Same as CH 561).

548 Biochemistry II (UAH) 3 hrs.
Metabolism, biosynthesis of macromolecular precursors, storage, transmission, expression of genetic information, and molecular physiology. Prerequisite: CH 561 or BYS 547. (Same as CH 562).

561 Physiological Ecology (UAH) 4 hrs.
Physiological and behavioral responses of organisms to natural changes in their chemical and physical environment. Prerequisite: BYS 312 or approval of instructor. BYS 361 or 532 recommended. Lab fee: Level 3.

562 Community Ecology (UAH) 4 hrs.
Detailed consideration of ecological principles and concepts, as well as biotic and abiotic factors relative to development of plant communities and ecosystems. Prerequisites: BYS 312 and taxonomy. One 4-hour lab a week. Lab fee: Level 3. Field trips required.

563 Population Ecology (UAH) 4 hrs.
Distribution, population dynamics and behavior of animal population in relation to environmental factors. Prerequisites: BYS 312 and organic chemistry. One 4-hour lab a week. Lab fee: Level 3. Field trips required.

564 Limnology (UAH) 4 hrs.
Fresh-water environments and organisms exemplified by lakes, ponds, and streams in North Alabama. Laboratory and required field trips. Occasional Saturday field trips required instead of week’s laboratory session. Prerequisites: BYS 312 and 315. 371 or 378. One 4-hour lab a week. Lab fee: Level 4.

571 Plant Anatomy (UAH and A&MU) 4 hrs.
Ontogeny, differentiation, and maturation of tissues and organs of angiosperms. Problems in growth and development of an angiosperm, using histological techniques. Prerequisite: BYS 372 or approval of instructor. Two 3-hour labs a week. Lab fee: Level 4.

578 Aquatic Arthropod Biology 4 hrs.
Systematics, Physiology, Ecology and Importance of the Crustacea, Insecta and Arachnida that inhabit freshwater and estuarine ecosystems. Particular attention will be given to those arthropods common to the aquatic systems in and around Alabama. Since all field trips are required, prospective students should consult with the instructor prior to registration. Prerequisite: BYS 378. Lab fee: Level 4.

621 Pathogenic Bacteriology (UAH) 4 hrs.
Detailed study of bacteria that cause infections in man. Mechanisms of pathogenicity and host-parasite relationships. One 2-hour lab a week. Lab fee: Level 5. Prerequisites: BYS 361, 421, 430, or equivalents, or approval of instructor.

624 Immunology (UAH) 4 hrs.
Theoretical and practical aspects of immunology. Current areas of immunology that are controversial. One 4-hour lab a week. Lab fee: Level 5. Prerequisites: BYS 361 and BYS 430 or approval of instructor.

633 Endocrinology (UAH) 3 hrs.
Anatomy, physiology, and biochemistry of endocrine glands. Emphasis on hormone secretions, regulation, integration, and mechanisms of action. Prerequisites: BYS 361, 532 or equivalent, or approval of instructor.
641 Advanced Cell Biology (UAH and A&MU) 4 hrs.
Integrated approach to fine structure and function of various cellular processes. Particular aspects of cellular processes each term, e.g. motility in cells and cellular differentiation. Laboratory included. Lab fee: Level 5. Prerequisite: Cellular and Developmental Biology or approval of instructor.

643 Microscopy (UAH) 4 hrs.
Introduction to the various methods of preparation for transmission electron microscopy and analysis of electron micrographs. Supporting techniques such as phase microscopy, autoradiography, scanning electron microscopy, negative staining, and cytochemistry. Lab fee: Level 7. Prerequisites: graduate standing and approval of instructor.

644 Topics in Cell and Developmental Biology and Biological Fine Structure (UAH) 2 hrs.
Discussion of current topics in cell biology with emphasis on student participation. Both plant and animal cells will be emphasized. Depending on the number of students, some terms may be devoted to short research problems. Prerequisite: BYS 543 or 643 or approval of instructor.

646 Molecular Genetics (UAH and A&MU) 3 hrs.
Molecular mechanisms underlying genetic principles. Structure of genes and chromosomes; primary, secondary, and tertiary structure of DNA; DNA replication; genetic recombination; RNA transcription; translation and replication; genetic recombination; RNA transcription; translation and genetic code; regulation of gene function; evolution at molecular level. Prerequisites: BYS 319 and BYS-CH 361.

647 Enzymology (UAH) 4 hrs.
Detailed study of enzymes including protein synthesis; primary, secondary, tertiary and quaternary structure; nomenclature, physiological and catalytic function; enzyme kinetics, and metabolic regulations of enzyme activity. Prerequisite: BYS 547 or CH 561 or approval of instructor.

648 Enzymology Laboratory (UAH) 2 hrs.
Techniques of isolation, purification, and characterization of enzymes. Prerequisite: BYS 647. Lab fee: Level 6.

653 Taxonomy of the Immature Insect (UAH and A&MU) 4 hrs.
Studies of the literature, comparative morphology and techniques of identification of immature stages of the insect, methods of collecting and preserving the immatures. Lab fee: Level 4. Prerequisite: BYS 455 or approval of instructor.

660 Ecosystem Dynamics (UAH) 3 hrs.
An analytical approach (including simulation and modeling) to the interactions of organisms in terrestrial, aquatic, and marine ecosystems. Prerequisites: BYS 564 and 562.

661 Advanced Population Ecology (UAH) 4 hrs.
Interaction of population structure, genetic properties, and ecology factors in controlling dynamics and evolutionary character of natural population. One 4-hour lab a week. Lab fee: Level 4. Prerequisites: BYS 312, BYS 564 or 565, or approval of instructor.

690 Seminar (UAH and A&MU) 1 hr.
Student reports on current journal articles. Graduate students should attend whether enrolled for credit or not.

691 Special Topics (UAH and A&MU) 1-4 hrs.
Literature search relative to topics of interest under supervision of instructor. For graduate students.
Individual investigations on graduate level of biological problems under supervision of graduate faculty member. A special problem may be carried out at Marine Environmental Sciences Consortium, Dauphin Island, Alabama. Available to thesis students. Lab fee: Level 3 for 2 hours; Level 4 for 3 hours; Level 5 for 4 hours; Level 5 for 5 hrs.

Master’s Thesis (UAH and A&MU)

Requirement each term student is working and receiving direction on master’s thesis. Minimum of six hours required for MS students. Maximum of nine hours credit upon successful completion of master’s thesis.

Advanced Undergraduate-Graduate Courses at Alabama A&M University

Courses offered jointly by Alabama A&M University and UAH but which are taught on the A&M campus are listed below for ready reference.

510 Radiation Biology (A&MU) 4 hrs. Characteristics of radioisotopes, detection and counting techniques and instrumentation, tracer techniques, health and safety system. Prerequisite: Consultation with instructor.

511 Biological Control (A&MU) 4 hrs. Components of resistance, use of parasites, predators and microorganisms, foreign exploration, shipment, release and establishment of imported parasites and predators.

512 Histotechniques (A&MU) 3 hrs. Microscopic study of the various tissues and organs of the animal systems.

522 Microbial Physiology (A&MU) 3 hrs. Relationship between structure and biochemical functions in microorganisms. Prerequisite: Microbiology, organic chemistry, and biochemistry. Lab fee: Level 4.

523 Principles of Virology (A&MU) 4 hrs. Principles of viral infectivity, multiplication, and chemical constitution; laboratory techniques for their isolation, cultivation, identification, and enumeration. Prerequisite: BYS 221.

526 Microbial Ecology (A&MU) 4 hrs. Relationship of soil and aquatic microorganisms and their importance in ammonification, nitrification, and other biological processes. Prerequisite: BYS 221.

533 Medical Physiology I (A&MU) 4 hrs. Nerve and muscle cell function, fluid and electrolyte environment of body tissues, blood, heart, circulatory, and nervous systems. Prerequisite: Organic chemistry, preferably biochemistry.

534 Medical Physiology (A&MU) 4 hrs. Continuation of Mammalian Physiology I with consideration of kidney function, respiratory, digestive, reproductive, and endocrine systems. Prerequisite: Medical Physiology I.

535 Endocrinology (A&MU) 4 hrs. Current developments on anatomy, physiology, chemistry, and regulations of major endocrine glands. Laboratory sessions in biological and chemical assays of hormones. Prerequisite: ZOO 409.

546  Cytogenetics (A&MU) 4 hrs.
Analysis of composition, morphology, and behavior of genes, especially as they relate to function, development, and heredity. Prerequisite: BIO 406.

549  Analytical Biochemistry Laboratory (A&MU) 2 hrs.
Advanced laboratory course dealing with modern techniques of molecular biology and biochemistry.

551  Insect Physiology (A&MU) 4 hrs.
Metabolism and utilization of carbohydrates, lipids, and nitrogen compounds; energy production, neuromuscular mechanisms, hormones and morphogenesis; role of organs and organ systems in metabolism. Prerequisites: general entomology or equivalent, advanced biochemistry.

552  Insect-Pest Management (A&MU) 4 hrs.
Insect surveys, ecological basis for control, plant and animal resistance to insects, control by parasites, predators, microorganisms, management by genetics principles, chemical attractants, chemical repellents, sterilization, insecticides, and integrated systems of pest management. Prerequisite: general entomology or advanced applied entomology.

560  Environmental Biology (A&MU) 3 hrs.
Principles of interaction between living systems and their resources. Current problems in management of our natural resources including new approaches in management of pest populations.

570  Plant Pathology (A&MU) 4 hrs.
History, nonparasitic, and parasitic diseases incited by bacteria, fungi, plasmodiophorales, nematodes, and viruses. Disease control through exclusion, eradication, protection, and post resistance. Prerequisite: BIO 344.

572  Plant Taxonomy (A&MU) 4 hrs.
Principles of classifying, naming, and identifying vascular plants with emphasis on flowering plants. Ecologic factors influencing vegetational distribution.

590  Problems in Biological Sciences (A&MU, Plan III Only) 4 hrs.
Problems of elementary and secondary school teachers of science in all areas of biological sciences. Relations of biological organisms to their environment, stressing climatic and soil factors that influence their distribution and adaptations. Provision for individual investigation in biological science.

622  Applied and Industrial Microbiology (A&MU) 4 hrs.
Examine by microbiological assay sewage disposal and waste water treatment plants. Microorganisms of industrial importance in biological production of antibiotics, vitamins, organic acids, and alcohols. Prerequisite: microbiology.

623  Advanced Virology (A&MU) 4 hrs.
Outline of field of virology stressing molecular biology of virus replication. Immunology, genetics, and epidemiology. Bacterial and vertebrate viruses although some discussion of plant and insect viruses. Prerequisites: Microbiology, Principles of Virology.

631  Medical Pharmacology (A&MU) 5 hrs.
Lecture and laboratory course. Drug-receptor interaction, kinetics of drug absorption, distribution and elimination, and discussion of drugs affecting different systems. Pharmacogenetics, toxicity, mutagenesis, teratogenesis, carcinogenesis, and drug interactions. Mechanism of action of drugs, in relation to their use as therapeutic agents in medicine. Prerequisites: Medical Physiology I and II.

632  Cardiovascular Physiology (A&MU) 3 hrs.
Mechanisms of cardiac muscle excitation and interaction. Analysis of peripheral circulation. Neural regulation of circulation. Angiograph, electrocardiography, and vectorcardiography as diagnostic tools. Prerequisites: Medical Physiology I and II.
642 Advanced Cell Physiology (A&MU) 4 hrs.
Biochemical and biophysical cytology. The cell as matter, life history of the cell, molecular basis of cellular activities, enzymes and energy conversions, functional localizations in subunits of the cell, mechanisms of motility, structure and function of cell membranes, effects of radiation on cells, biochemical control mechanisms, cellular differentiation and interaction between cells, hypotheses of cellular origins. Prerequisites: molecular biology, physics, cytology, biochemistry. Laboratory included.

645 Human Cytogenetics and Its Clinical Application (A&MU) 3 hrs.
Review of normal human chromosome structure and normal chromosome segregation and morphology with clinical consideration.

Economic thresholds, economic injury levels, population dynamics, residues in food crops, chemical control, insect transmission of plant disease, and livestock. Prerequisite: general entomology.

672 Advanced Systematic Botany (A&MU) 4 hrs.
Classification, nomenclature, and taxonomic theory of vascular plants. Prerequisite: plant taxonomy.

Marine Sciences (MS)

Courses are offered only at the Marine Environmental Sciences Consortium Sea Lab at Dauphin Island, Alabama.

Courses that can be included in a biological sciences major or minor:

202 Marine Biology 4 hrs.
Survey of invertebrates, vertebrates, and marine plants as communities with local examples of groups. Examination of marshland, estuarine, beach, dune inlet and neritic habitats, and niches. Lectures, laboratory, and field work. Prerequisite: general biology.

304 Coastal Zone Management 2 hrs.
Examination of ecological features and physical management policies design for coastal communities and a review of the Federal and State programs that impinge upon coastal ecological communities.

502 Marine Botany 4 hrs.

503 Marine Invertebrate Zoology 4 hrs.
Local examples of principal groups of marine invertebrates. Reproduction, distribution, taxonomy, systematics, and ecology. Lecture, laboratory, and field work. Opportunity to acquire collection of local fauna. Prerequisite: General biology.

505 Marine Vertebrate Zoology 4 hrs.

506 Marine Zoogeography 4 hrs.
Physical, chemical, and biological factors influencing distribution of marine organisms. Importance of continents, open oceans, and species competition on animal distribution. Zoogeographical patterns in Gulf of Mexico, western North Atlantic, and Caribbean regions. Prerequisite: 12 semester hours of biological sciences.
507 Physiology of Marine Animals 4 hrs.
Environmental adaptations of marine animals. Biochemical, osmotic, respiratory, and
temperature responses of both invertebrates and fish. Prerequisite: 12 hours in bio­
logical sciences. Biochemistry recommended.

508 Marine Plankton 4 hrs.
Physical, chemical, and biological factors influencing distribution of marine organ­
isms. Emphasis on western North Atlantic Ocean. Prerequisite: Invertebrate zo­
logy.

509 Marine Ecology 4 hrs.
Bioenergetics, community structure, population dynamics, predation, competition,
and speciation in marine ecosystems. Lecture, laboratory, and field work. Students
admitted without previous marine courses. For engineers and other nonbiologists inter­
ested in marine environment. Individual species as they relate to ecological prin­
ciples exemplifying taxonomic and ecologic backgrounds. Prerequisites: Introduc­
tory ecology. Chemistry and physics recommended; marine invertebrate zoology help­ful.

510 Marsh Ecology 4 hrs.
Basic understanding of ecology of salt marsh. Habitat analysis, natural history stud­
ies, and population dynamics of selected vertebrates. Specific field problem termi­
nated by a technical paper assigned to each student. For advanced undergraduates
and graduate students. Prerequisite: Introductory ecology.

511 Benthic Community Structure 4 hrs.
Patterns of benthic macroinvertebrate abundance and distribution along Alabama
coastline. Field sampling, taxonomy, and data analysis in lectures and labs. Major
taxa such as polychaetes and crustaceans. Prerequisite: Invertebrate zoology.

512 Fisheries Science 4 hrs.
Principles and methods of marine fishery biology and their application to conserva­
tion. Lecture and laboratory work. Prerequisite: General biology.

513 Fisheries Economics 4 hrs.
Physical and biological environment of commercial marine organisms and its effect
on distribution and natural fluctuations in abundance. Man’s impact on population
through fishing and habitat alteration. Ecology and life history of major groups.
Problems of managing fishery resources through regulation, mariculture, and pres­
ervation of specialized habitats. Prerequisite: General biology.

515 Coastal Ornithology 4 hrs.
Coastal and pelagic birds with emphasis on ecology, taxonomy, and distribution. Food
habits, field identification, and population dynamics. Prerequisite: Introductory
zoology.

517 Marine Technical Methods III 2 hrs.
Advances laboratory instrumentation and techniques; individual projects with one
of the following: Liquid scintillation counting, electrophoresis, atomic absorption
spectrophotometry, UV-visible spectrophotometry or fluorometry or other tech­
niques. Prerequisites: Science major; permission of instructor.

525 Marine Biology for Teachers 6 hrs.

590 Seminar 1 hr.
Current research, scientific progress, and problems in marine environment. Participa­
tion by students, faculty, and visiting scientists. Students are not required to en­
rroll in seminar, but must attend to qualify for credit in any other course.

599 Research 1-4 hrs.
Enrollment by special arrangement in any subjects listed. Prerequisite: Arrangements
with and approval of project supervisor and liaison officer. Students should note which term to take special topics in a particular subject. Only Marine Science Program resident faculty are available for special topics both terms. Other instructors available only time listed for their courses.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>610</td>
<td>Marine Systems Ecology</td>
<td>4 hrs.</td>
</tr>
<tr>
<td>203</td>
<td>Natural History of Commercial Invertebrates</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>204</td>
<td>Commercial Marine Fisheries of Alabama</td>
<td>2 hrs.</td>
</tr>
<tr>
<td>301</td>
<td>Marine Technical Methods I</td>
<td>2 hrs.</td>
</tr>
<tr>
<td>302</td>
<td>Marine Technical Methods II</td>
<td>2 hrs.</td>
</tr>
<tr>
<td>303</td>
<td>Coastal Climatology</td>
<td>2 hrs.</td>
</tr>
<tr>
<td>501</td>
<td>Introduction to Oceanography</td>
<td>4 hrs.</td>
</tr>
<tr>
<td>514</td>
<td>Estuarine Science</td>
<td>4 hrs.</td>
</tr>
<tr>
<td>516</td>
<td>Scientific Data Management</td>
<td>2 hrs.</td>
</tr>
<tr>
<td>520</td>
<td>Marine Geology</td>
<td>4 hrs.</td>
</tr>
<tr>
<td>521</td>
<td>Recent Marine Sedimentation</td>
<td>4 hrs.</td>
</tr>
<tr>
<td>522</td>
<td>Marine Paleoecology</td>
<td>4 hrs.</td>
</tr>
<tr>
<td>601</td>
<td>Oceanology of Gulf of Mexico</td>
<td>4 hrs.</td>
</tr>
</tbody>
</table>
Chemistry Department

Professors Baird, Gregory, Harris, Loo, McManus, Riley (chair); Research Professor Fredericks; Associate Professors Coble, Emerson, Leslie, Meehan, Setzer; Assistant Research Professor Kaukler; Assistant Professors Lumpkin, Weimer.

Undergraduate Programs

The academic program in chemistry at the University of Alabama in Huntsville has received the approval of the American Chemical Society in recognition of its strong faculty and excellent facilities for high quality undergraduate instruction. The Chemistry Department offers courses leading to the B.S. degree with major in chemistry and supports undergraduate programs in other disciplines.

Six chemistry major curricula are offered which provide preparation for: (1) medical school, dental school, or veterinary school; (2) the Alabama Class B High School Teachers Certificate; (3) graduate study in chemistry and/or employment as an industrial chemist; (4) general education in chemistry; (5) graduate study combining chemistry and physics; and (6) employment as a biochemist or clinical chemist.

Chemistry Major

Requirements for the chemistry major include:

1. The minimum total semester hours required for the B.S. is 128. Of these, at least 39 semester hours must be in courses numbered 300 or higher.
2. Mastery of elementary calculus by successful completion of MA 153 and 154.
3. Successful completion of PH 111 and 112.
4. Completion of the university's General Education Requirements (GER). For a chemistry major, the GER requirement (a) consists of the following:

   English (6 hours of composition and 6 hours of literature) 12 hours
   History (HY 101 and HY 102) 6 hours
   Social Science (one discipline) 6 hours
   Fine Arts 6 hours
   Mathematics (MA 153) (b) 3 hours
   Foreign Language and Communication Skills
     This requirement may be satisfied by choosing either
     (1) Foreign language
         One language, usually German or Russian. If the language has not been studied previously, the full 12 hours will be required.
     or
     (2) Communication Skills (CS 108 or 113; CM 113; EH301)
     Laboratory Science and Technical Studies (c)
     (1) Two courses in a single laboratory science outside the major and the minor (d)
     and
     (2) Coursework (to include at least one laboratory science) in any department or program (outside the major and the minor) in the Colleges of Science and/or Engineering (e)

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Notes:
(a) The section of the catalog dealing with the GER requirements of the university should also be consulted for details.
(b) If the student’s minor is mathematics, this requirement is waived.
(c) Applicable laboratory sciences are Astronomy, Biological Sciences, Environmental Science, Physics, and some courses in the College of Engineering.
(d) Ordinarily met by taking PH 111 and PH 112.
(e) Ordinarily met by taking PH 113 and 116 and 3-4 hours of an applicable laboratory science or mathematics. If the minor is not mathematics, then PH 113, 116, and MA 154 satisfy this requirement.

5. Completion of a minor consisting of at least 21 hours of course work in any subject other than chemistry. The course requirements for minors can be found in the sections of this catalog dealing with the various departments. An educationally compatible combination of courses from more than one department can be substituted for the minor. This is called Cognate Studies.

6. Completion of sufficient electives to meet the overall minimum hour requirements for the degree.

7. Completion of one of the six chemistry curricula shown below, or another developed in consultation with a Chemistry Department advisor. The student is allowed considerable flexibility in planning his program, but all course patterns that differ from those listed below require faculty approval.

Curriculum I Premedical Program
The premedical program conforms to the requirements of most medical schools and contains sufficient chemistry to meet the requirements of a chemistry major. Prospective medical students should explore their areas of interest outside of the sciences and strive for maximum scholastic achievement. Students should consult with the Preprofessional Advisory Committee early in their college program and prepare to take the Medical College Aptitude Test during the spring of their junior year. (For alternative premedical curricula, see Chemistry Curriculum VI and Biological Sciences Curriculum VI.)

<table>
<thead>
<tr>
<th>GER (humanities and social sciences)</th>
<th>54-58</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry - CH 121, 123, 125, 126, 223, 331, 332, 333, 335, 336, 341, 342, 343, 345 plus 6 hours at the 300 level or above</td>
<td>35</td>
</tr>
<tr>
<td>Physics - PH 113</td>
<td>3</td>
</tr>
<tr>
<td>Mathematics - MA 233, 244, 251, and 352</td>
<td>12</td>
</tr>
<tr>
<td>Biological Sciences - BYS 112, 114, 319, 361 and 362 are recommended.</td>
<td>27</td>
</tr>
</tbody>
</table>

Curriculum II Class B High School Teachers Certificate
B.S. degree with major in chemistry. This plan meets the requirements for an Alabama Class B High School Teachers Certificate.

<table>
<thead>
<tr>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GER (humanities and social sciences)</td>
</tr>
<tr>
<td>Chemistry - CH 121, 123, 125, 126, 223, 315, 331, 332, 333, 335, 336, 361, 362, 347, and 348.</td>
</tr>
<tr>
<td>Physics - PH 113</td>
</tr>
<tr>
<td>Mathematics - MA 233</td>
</tr>
<tr>
<td>Biological Sciences (minimum requirements)</td>
</tr>
<tr>
<td>Second Teaching Area</td>
</tr>
</tbody>
</table>
NOTES:
1. This curriculum will probably require more than the minimum total of 128 hours.
2. Students pursuing this curriculum should consult with the Department of Education early in their program.
3. A general sciences composite major covering the areas of chemistry, biological sciences, environmental science and physical sciences is possible under this curriculum. Interested students should consult the Education Department.

Curriculum III Graduate Preparatory Program
This curriculum is approved by the American Chemical Society’s Committee on Professional Training. It is designed for a student who plans to do graduate work or desires an industrial position that requires a strong chemical background. German is the recommended language for this program.

<table>
<thead>
<tr>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GER (humanities and social sciences)</td>
</tr>
<tr>
<td>Chemistry - CH 121, 123, 125, 126, 223, 331, 332, 333, 335, 336, 337, 341, 342, 343, 345, 346, 401, 402, 421, 493 plus 3 hours at the 300 level or above</td>
</tr>
<tr>
<td>Physics - PH 113</td>
</tr>
<tr>
<td>Mathematics - MA 233, 244, 251, and 352</td>
</tr>
</tbody>
</table>

Curriculum IV General Education Curriculum
General education curriculum with a chemistry major. Deficiencies may exist with respect to graduate school entrance requirements.

<table>
<thead>
<tr>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GER (humanities and social sciences)</td>
</tr>
<tr>
<td>Chemistry - CH 121, 123, 125, 126, 223, 331, 332, 333, 335, 336, 337, 341, 342, 343, 345, 346, 401, and 493 plus 3 hours at the 300 level or above.</td>
</tr>
<tr>
<td>Physics - PH 113</td>
</tr>
<tr>
<td>Mathematics - MA 233, 244, 251, and 352</td>
</tr>
</tbody>
</table>

Curriculum V Chemical Physics Curriculum
Chemistry-physics program appropriate for pregraduate education.

<table>
<thead>
<tr>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GER (humanities and social sciences)</td>
</tr>
<tr>
<td>Chemistry - CH 121, 123, 125, 126, 223, 331, 332, 333, 335, 336, 337, 341, 342, 343, 345, 346, 401, 402, 421 and either 493 or 553</td>
</tr>
<tr>
<td>Physics - PH 113, 301, 302, 337, 431, 432</td>
</tr>
<tr>
<td>Mathematics - MA 233, 244, 251, 352, and one elective</td>
</tr>
</tbody>
</table>

Curriculum VI Biochemistry Curriculum
This curriculum is approved by the American Chemical Society’s Committee on Professional Training. It constitutes a typical chemistry - biological sciences program appropriate for employment in biochemistry or clinical chemistry and for admission to some Ph.D. granting programs.
graduate departments of biochemistry. Although less dependent on quantitative skills, this curriculum also provides a satisfactory foundation for admission to medical school.

Curriculum VI meets the minimum requirements of the American Association of Clinical Chemistry. A person completing one year of acceptable experience in clinical chemistry subsequent to the B.S. degree may apply for certification as a clinical chemical technologist. Further successful experience may lead to certification as a clinical chemist.

<table>
<thead>
<tr>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GER (humanities and social sciences)</td>
</tr>
<tr>
<td>Chemistry — CH 121, 123, 125, 126, 223, 331, 332, 333</td>
</tr>
<tr>
<td>Biological sciences — BYS 112, 114, 221, 319, 543 and 544</td>
</tr>
</tbody>
</table>

Notes applying to all curricula above:

(a) Credit may be obtained for Chemistry 121, 123, 125, and 126 by making a satisfactory score on the CLEP examination. This examination is offered at various times during the year through the Office of Testing Services. Students pursuing credit by examination should consult the Chemistry Department before taking the examination. Credit is also granted to a student who submits a score of 3 or higher on the Advanced Placement Programs of the College Entrance Examination Board.

(b) Transfer students wishing to major in chemistry must complete at least 9 semester hours of chemistry at the level of 300 or above at UAH. Courses in organic chemistry completed at the junior college level may be used to satisfy prerequisite requirements for upper level chemistry courses at UAH but do not count toward the hour requirements of the major.

(c) No credit toward the chemistry major is given for CH 101, 105, or any mathematics course numbered lower than MA 153. A student requiring these courses should understand that the total credit hours of course work required to meet all the degree requirements may exceed the minimum of 128 hours required for the B.S. degree.

(d) Unless attention is given to the sequence in which courses are scheduled, chemistry majors may experience difficulty in completing the required courses within a four-year period. Students should plan to take CH 223, 333, and all the mathematics and physics courses required by their chosen curriculum before the fall term of their junior year.

Chemistry Minors

Typical course sequences for students wishing to minor in chemistry include the following. Each requires at least 21 hours of chemistry including 6 or more hours numbered 300 or above. Courses in organic chemistry completed at the junior college level may be used to satisfy prerequisite requirements for upper level chemistry courses at UAH but do not count toward the hour requirements of the minor.

1. CH 121, 125, 123, 126, 223, 331, 332, 333, 335, and 336 for premedical and predental students.
2. CH 121, 125, 123, 126, 223, 331, 332, 335, 361, 362 for some biology and medical technology majors.
3. CH 121, 125, 123, 126, 331, 332, 335, 341, 342, 343 for physics and mathematics majors.
4. CH 121, 123, 125, 126, 223, 331, 332, 335, 347 for biology majors taking BYS 361 and 362.
# Chemistry (CH)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>Introduction to Chemistry</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Properties of solids, liquids, gases, and solutions, atomic theory and bonding, concentration concepts, and physical and chemical properties of the more common elements and their compounds. CH 101 does not count toward the chemistry major or minor. Chemistry majors or minors taking CH 101 get elective credit only. CH 101 may be used with CH 105 and CH 113 to fulfill the laboratory science requirement of the GER. No placement examination is required for enrollment in CH 101. The student may opt to take CH 101 even if he has achieved a satisfactory score on the placement examination for enrollment in CH 121. Prerequisite: MA 105 or 119 or mathematics Level II placement. Parallel: CH 105.</td>
<td></td>
</tr>
<tr>
<td>105</td>
<td>Introductory Chemistry Laboratory</td>
<td>1 hr.</td>
</tr>
<tr>
<td></td>
<td>Laboratory fundamentals and basic chemical principles. A student enrolled in a B.S. degree program who plans to take CH 121 and CH 125 and has had chemistry laboratory experience may be exempt from CH 105 by permission of Chemistry Department chairman. CH 105 may not be counted toward the chemistry major or minor. Chemistry majors or minors receive only elective credit. Parallel: CH 101. Lab fee: Level 4.</td>
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<tr>
<td>113</td>
<td>Elementary Organic Chemistry</td>
<td>4 hrs.</td>
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<td></td>
<td>Nomenclature, structure, functional groups, and properties of organic compounds. Recommended for nursing majors, some biology minors, and as a sequence to CH 101 and 105 for an 8-hour laboratory science requirement for nonscience majors. Not open to chemistry majors and minors. Laboratory included. Prerequisite: CH 101, 105; equivalent or placement examination. Lab fee: Level 4.</td>
<td></td>
</tr>
<tr>
<td>121</td>
<td>General Chemistry</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>For science and engineering majors. Properties of gases, liquids, solids, and solutions. Nature of the chemical bond, kinetics, chemical equilibrium, electrochemistry, thermochemistry, chemical properties of elements, their periodic groups, and their compounds. Introduction to nuclear chemistry. Prerequisites: CH 101 or placement test and MA 105 or MA 119 or placement Level II mathematics: parallel: CH 125.</td>
<td></td>
</tr>
<tr>
<td>123</td>
<td>General Chemistry</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Continuation of 121 with in-depth study of topics listed. Prerequisite: CH 121. Parallel: CH 126.</td>
<td></td>
</tr>
<tr>
<td>125</td>
<td>General Chemistry Laboratory</td>
<td>1 hr.</td>
</tr>
<tr>
<td></td>
<td>Laboratory work complements the lecture material for CH 121. Parallel: CH 121. Lab fee: Level 4.</td>
<td></td>
</tr>
<tr>
<td>126</td>
<td>Qualitative Inorganic Analysis Laboratory</td>
<td>1 hr.</td>
</tr>
<tr>
<td></td>
<td>Chemical equilibrium applied to the systematic separation and qualitative detection of the elements. Application of chemical and physical properties of numerous metal and complex ions and compounds. Parallel: CH 123. Lab fee: Level 4.</td>
<td></td>
</tr>
<tr>
<td>223</td>
<td>Quantitative Analysis</td>
<td>4 hrs.</td>
</tr>
<tr>
<td></td>
<td>Background in fundamental quantitative analytical chemistry with an introduction to instrumentation. Data treatment, ionic equilibria, elementary electrochemical, spectrochemical, gravimetric, and volumetric techniques. Laboratory included. Lab fee: Level 5. Prerequisite: CH 126.</td>
<td></td>
</tr>
</tbody>
</table>
Elementary Biochemistry 3 hrs.
Biochemistry and energetics of living cells, metabolism, structure and function of carbohydrates, lipids, proteins and nucleic acid. Enzymes, coenzymes, vitamins, blood, endocrine glands, DNA synthesis and gene expression, nutrition, drugs and biochemistry of specialized tissues. Prerequisites: BYS 114 and CH 101. No credit given to chemistry majors or minors. Credit in CH 361 precludes credit in CH 301. (Same as BYS 301).

Chemical Demonstrations 2 hrs.
A laboratory course designed for elementary and secondary education majors involving development and presentation of demonstrations which illustrate important and exciting chemical principles. Prerequisites: CH 113 or 223 or permission of the instructor. Lab fee: Level 3.

Organic Chemistry 3 hrs.
Chemistry of organic compounds. Synthetic methods, theory, and reaction mechanisms. Prerequisites: CH 123, 126; CH 223 recommended.

Organic Chemistry 2 hrs.
Continuation of CH 331. Prerequisite: CH 331.

Organic Chemistry 2 hrs.
Continuation of CH 332. Prerequisite: CH 332.

Organic Chemistry Laboratory I 1 hr.
Techniques of organic chemistry including synthesis, separation, and identification of organic compounds with use of chemical and spectroscopic methods. Prerequisite or parallel: CH 331. Lab fee: Level 5.

Organic Chemistry Laboratory II 1 hr.
Continuation of CH 335. Prerequisite: CH 335. Prerequisite or parallel: CH 332. Lab fee: Level 5.

Organic Chemistry Laboratory III 2 hrs.
Advanced organic chemistry laboratory treating reactions and techniques not covered in CH 335 and 336. Pursuit of a special open-ended problem by each student. Prerequisite: CH 336 and approval of instructor. Lab fee: Level 6.

Chemical Thermodynamics 3 hrs.
Theory of classical thermodynamics and its application to the chemistry of solid, liquids, gases, and solutions. Prerequisites: CH 223, MA 251 and PH 112. Credit in CH 341 precludes credit in CH 347.

Chemical Dynamics 2 hrs.
Kinetic theory of gases, theory and formulation of rate equations, mechanisms of chemical reactions, and applications. Prerequisite: CH 343. Credit in CH 342 precludes credit in CH 348.

Introduction to Quantum Chemistry 2 hrs.
Quantum mechanical treatment of the chemical bond. Prerequisites: CH 341, PH 113, and MA 352.

Experimental Physical Chemistry I 1 hr.
Laboratory investigations into thermodynamics. Prerequisite: CH 223 and 341 or 347. Lab fee: Level 5.

Experimental Physical Chemistry II 1 hr.
Laboratory investigations into kinetics and spectroscopy. Prerequisite: CH 345. Parallel: CH 342 or 348. Lab fee: Level 6.
347 Biophysical Chemistry I 3 hrs.

348 Biophysical Chemistry II 3 hrs.

361 General Biochemistry I 3 hrs.
Detailed study of molecules that comprise living systems. Their nomenclature, structure, properties, and functions in metabolism. Enzymatic properties and function; major and minor biosynthetic and catabolic pathways, their interrelations and control mechanism. Glycolysis and gluconeogenesis, Kreb’s cycle, photosynthesis, lipids, amino acids and protein, and nucleic acids. Prerequisites: BYS 114, CH 332, and CH 335. (Same as BYS 361).

362 General Biochemistry Laboratory I 1 hr.
Practical experience in isolation, qualitative identification, and quantitative estimation of biomolecules. Prerequisite or parallel: CH 361. Prerequisite: CH 223. One 4-hour lab a week. Lab fee: Level 6. (Same as BYS 362).

363 General Biochemistry II 3 hrs.
A continuation of CH 361 to include biosynthesis of biomolecules, metabolism, DNA and RNA, the genetic code, protein biosynthesis, genes and molecular physiology. Prerequisite: CH 361. CH 348 is recommended. (Same as BYS 363).

364 General Biochemistry Laboratory II 1 hr.
An experimental course illustrating the topics in CH 363. Prerequisites: CH 361 and CH 362. Parallel CH 363. Lab fee: Level 5. (Same as BYS 365).

401 Inorganic Chemistry 3 hrs.
Fundamental topics in inorganic chemistry. Atomic structure, chemical bonding, periodic relationships, acid-base theories, nonaqueous solvents, and reaction mechanisms. Prerequisite or parallel: CH 342 or 348.

402 Inorganic Chemistry Laboratory 1 hr.
Laboratory techniques of inorganic chemistry including synthesis, purification, isolation, and identification of inorganic compounds. Prerequisite: CH 401. Lab fee: Level 6.

421 Instrumental analysis 4 hrs.
Introduction to modern analytical instrumentation including IR, UV and atomic absorption spectrophotometers, nuclear magnetic resonance, electroanalytical equipment, and gas and liquid chromatographs. Lecture and laboratory. Prerequisite: CH 346. Lab fee: Level 6.

480 Selected Topics in Chemistry 1-3 hrs.
Special offerings to students in areas of interest not covered in present curriculum. Prerequisite: senior standing and approval of instructor.

491, 492, 493 Introduction to Chemical Research 1-3 hrs.
Personalized programs to round out the undergraduate curriculum of students with various goals. Prerequisite or parallel: CH 345 and senior standing. Approval of supervising faculty member and chemistry chairman required. Registration utilizes last digit of course number to designate semester-hour credit. Student normally may elect only up to 6 hours. Lab fee: Level 4 for CH 492, Level 5 for CH 493. No fee for CH 491.
Graduate Program

Research

Research in the Department of Chemistry is pursued along all five of the main subdivisions of the subject (analytical, biochemistry, inorganic, organic, and physical). This work traditionally has been closely linked with projects underway at the nearby U.S. Army's Redstone Arsenal and NASA's Marshall Space Flight Center. For example, graduate students are currently investigating methods for the destruction of chemical warfare agents. Others are using state-of-the-art instrumentation to develop experiments in chemical hydrodynamics for testing on sounding rocket flights and on flights of the Space Shuttle. Students have access not only to the University Library, with 6000 holdings in chemistry and 150 current chemical journal subscriptions, but also to the U.S. Army Redstone Scientific Information Center, which is one of the best scientific libraries in the country. This exposure to research in major U.S. Government laboratories provides students with a background which is attractive to both industrial and government employers.

Equipment

Major equipment in the Chemistry Department includes: IBM 200 MHz Fourier transform nuclear magnetic resonance spectrometer equipped for both liquid and solid phase studies, Auger electron spectrometer, GC/MS, fluorescence spectrometer, X-ray photoelectron spectrometer, plasma chemistry apparatus, Perkin-Elmer spectrometer, Jarrell-Ash 2 meter spectrometer, Varian Dris-90 ultraviolet-visible spectrometer with kinetics apparatus, Beckman DB-G visible-ultraviolet spectrometers, Raman spectrometer with laser excitor, Picker x-ray diffractometer and several atomic absorption spectrometers, polarography system, Waters binary gradient liquid chromatography system, Perkin-Elmer high pressure liquid chromatograph, gas chromatographs and various CW and pulsed lasers. The University has an upgraded UNIVAC 1100/70 computer, and has access to a Cray-XMP supercomputer at the Alabama Supercomputer Center, which is in Huntsville. The Chemistry Department has numerous Sperry personal computers available for student use.

Admission Requirements

General requirements of the School of Graduate Studies must be satisfied. In addition, students admitted to the graduate chemistry program are assumed to have training equivalent to the chemistry B.S. degree recommended by the American Chemical Society. The ACS-approved degree includes lecture and laboratory work in elementary chemistry, organic chemistry, physical chemistry, inorganic chemistry, analytical chemistry (including instrumental analysis), elementary physics, and mathematics through linear algebra and differential equations. Graduation from an undergraduate program not adhering to ACS standards does not preclude entrance into the UAH program. Students should realize, however, that if deficiencies exist, some additional undergraduate courses may be required. The time required to complete the M.S. Degree may then be proportionately increased.

Master of Science

General requirements of the School of Graduate Studies under Plan I or Plan II must be satisfied. The M.S. degree is a general degree in chemistry. As such, it is based upon a core sequence of courses emphasizing four of the five main subdivisions of chemistry.

Plan I. This plan requires 24 semester hours of graduate coursework, which must include the core sequence consisting of CH 531, 600, 631, 640, 642, and 561 or 621. CH 621 is preferred if students have not completed CH 421 or CH 521 at UAH or the equivalent elsewhere.
Students must register for CH 780 during every term in which they are in residence at UAH. Additional requirements include a thesis and reading competence in German or Russian. The faculty may accept other languages under special circumstances. Demonstration of computer machine language skills or B grades or better in CS 113 and 208 may also be substituted. International students may replace CS 113/208 with English courses or by a demonstrated mastery of English. (See the department chair for further information.) A particular program of study must be planned in consultation with a member of the chemistry faculty assigned by the department chair as a temporary advisor. After a student following Plan I selects his thesis topic, a supervisory committee will be appointed.

Plan II. This plan requires 33 or more semester hours of coursework, of which 18 hours must be in chemistry. The coursework must include the core sequence CH 531, 600, 631, 640, 642, and 561 or 621. CH 621 is preferred if students have not completed CH 421 or 521 at UAH or the equivalent elsewhere. Students must register for CH 780 during every term in which they are in residence at UAH. Half of any coursework taken in departments other than chemistry must be at the 600 level or above. A particular program of study must be planned in consultation with a member of the chemistry faculty assigned by the department chair as an advisor. A final comprehensive examination is required consisting of written examinations over each of two subdisciplines of chemistry. Foreign language proficiency is not obligatory, and a thesis is not required.

Because Plan II does not require any experimental work, it is not recommended for students seeking employment as industrial laboratory chemists.

Non-Traditional Fifth-Year Program Leading to the M.S. in Chemistry Plus a Class A Alabama High School Teachers Certificate

Those who have a BA or BS degree with a major or its equivalent in chemistry as determined by the Department of Chemistry, who have not taken more than twelve semester hours in teacher education (graduate or undergraduate), and who are interested in obtaining Class A (master’s level) certification for secondary school teaching, should consider the Non-Traditional Fifth Year Program. Contact the Education Department for preliminary advisement on admission and general program requirements. See the description in the Education section for more details.

Doctor of Philosophy

The Ph.D. in Chemistry may be obtained at UAH through co-operative study with the University of Alabama in Tuscaloosa (UA) or the University of Alabama in Birmingham (UAB). The Ph.D. requirements of the School of Graduate Studies and the Chemistry Department at either UA or UAB must be fulfilled. Consult the respective graduate catalogs. The following considerations are made for UAH cooperative students:

1. Only nine months of residency are required in Tuscaloosa or Birmingham.
2. Cumulative examinations may be taken at UAH.
3. Research may be done at UAH.
4. One or two UAH chemistry faculty members may serve on the dissertation committee.

Graduate Courses

521 Chemical Instrumentation 4 hrs.
Use of basic instrumentation in electrochemical, chromatographic, and spectrophotometric analysis. Laboratory work emphasizes utility of operational amplifiers in making chemical measurements. Introduction to digital logic. Prerequisite: CH 346. Lab fee: Level 6.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
<th>Description</th>
<th>Prerequisites</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>525</td>
<td>Environmental Chemistry</td>
<td>3 hrs.</td>
<td>Principles of quantitative analyses related to minor components of a sample. Applications selected from principal analyses necessary to maintain environmental quality of air, water, and soil. Selection of conditions for collecting reliable samples, concentration of components with techniques for increasing concentration of selected component, relationships between physical and chemical changes in sample and signal output of predominant transducers, and translation of chemical analysis into meaningful specifications. Lecture only. Prerequisites: CH 521 or 223; EG 311, 342. (Same as ES 525).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>531</td>
<td>Theoretical Organic Chemistry</td>
<td>4 hrs.</td>
<td>Molecular orbital theory and bonding, molecular structure, frontier molecular orbitals, pericyclic reactions, and reactive intermediates. Extensive computational laboratory work included. Prerequisites: CH 333, and 342 or 348 or approval of instructor. Lab fee: Level 5.</td>
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<tr>
<td>540</td>
<td>High Polymer Chemistry</td>
<td>3 hrs.</td>
<td>Theory of polymer formation and structural dependence of polymer properties. Prerequisites: CH 337, and 342 or 348.</td>
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</tr>
<tr>
<td>549</td>
<td>Spectroscopy and Molecular Structure</td>
<td>3 hrs.</td>
<td>Intermediate level treatment of principles of spectroscopy and their application to determination of molecular structure. Prerequisite: CH 343.</td>
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<tr>
<td>553</td>
<td>Introductory Quantum Mechanics I</td>
<td>3 hrs.</td>
<td>Prerequisites: CH 343, PH 351, MA 244, 251, 352. (Same as PH 551).</td>
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<tr>
<td>554</td>
<td>Introductory Quantum Mechanics II</td>
<td>3 hrs.</td>
<td>Prerequisite: CH 553. (Same as PH 552).</td>
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<td></td>
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<tr>
<td>560</td>
<td>X-Ray Structure Determination</td>
<td>4 hrs.</td>
<td>The course will examine both theoretical and practical aspects of molecular structure determination by x-ray diffraction methods. Topics include diffraction of x-rays, symmetry operations and space groups, methods of data collection, theory of structure factors and Fourier synthesis, least squares methods of structure refinement. Extensive laboratory and computer work included. Prerequisites: senior standing in chemistry or physics and approval of the instructor. Lab fee: Level 6.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>561</td>
<td>Biochemistry I</td>
<td>3 hrs.</td>
<td>Structural chemistry and function of biomolecules, mechanisms of biochemical reactions, enzyme kinetics, and energy transfer. Prerequisite: CH 333 or CH 361. (Same as BYS 547).</td>
<td></td>
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</tr>
<tr>
<td>562</td>
<td>Biochemistry II</td>
<td>3 hrs.</td>
<td>Metabolism, biosynthesis of macromolecular precursors, storage, transmission, and expression of genetic information, and molecular physiology. Prerequisite: CH 561. (Same as BYS 548).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>565</td>
<td>Molecular Biochemistry Laboratory</td>
<td>2 hrs.</td>
<td>Practical experience in isolation and characterization of biomolecules. Prerequisite: CH 562. Lab fee: Level 6.</td>
<td></td>
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</tr>
<tr>
<td>600</td>
<td>Advanced Inorganic Chemistry</td>
<td>3 hrs.</td>
<td>Survey with emphasis on structure and reactivity of inorganic compounds. Prerequisite: CH 401.</td>
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<tr>
<td>601</td>
<td>Structural Methods in Inorganic Chemistry</td>
<td>3 hrs.</td>
<td>Physical methods applied to determination of structure of inorganic compounds. Prerequisite: CH 600.</td>
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</table>
602 Chemistry of Coordination Compounds
Modern bonding theory and stereochemistry of coordination compounds. Prerequisite: CH 600.

603 Chemistry of Nonmetal Compounds
Chemistry of selected nonmetal compounds. Prerequisite: CH 601.

621 Methods of Chemical Analysis
Literature, seminar course. Theory and methodology of various techniques of chemical analysis. Prerequisite: CH 521 or CH 421.

627 Instrumental Methods for Materials Characterization
Principles of operation and use of instruments for X-ray diffraction, X-ray photoelectron spectroscopy, scanning Auger microscopy, and Raman spectroscopy. Using commercial instruments, students will prepare samples and perform analyses of a variety of materials types (ceramics, metals and polymers). For each experiment, students will carry out the data analysis and prepare a report. One four-hour laboratory per week. Lab fee: Level 10. Prerequisite: CH 346 or 421.

631 Advanced Organic Chemistry I
Organic synthetic reactions. Survey of certain reactions that enjoy widespread application to the synthesis of organic compounds. Prerequisites: CH 333, 342, or approval of instructor.

632 Advanced Organic Chemistry II
Physical organic chemistry. Reactive intermediates, structure-activity relationships, reaction mechanisms and techniques used to determine them. Prerequisite: CH 531 or approval of instructor.

640 Advanced Chemical Thermodynamics
First, second, and third laws of thermodynamics and applications. Brief introduction to statistical thermodynamics. Prerequisites: CH 343, MA 251, or approval of instructor.

641 Statistical Thermodynamics
Principles leading to the development of Maxwell-Boltzmann, Bose-Einstein, and Ferm-Dirac statistics. Thermodynamic properties calculated from partition functions. Prerequisite: CH 343.

642 Advanced Chemical Dynamics
Velocity of chemical reactions in homogeneous and heterogeneous systems. Absolute rate theory, collision theory, scattering, and concept of reaction cross sections. Prerequisite: CH 640.

643 Quantum Chemistry
Application of quantum theory to the chemical bond. Prerequisite: CH 343.

644 Chemical Electrodynamics
Electrodynamics problems encountered in Chemistry. Maxwell’s equations, electrostatics. Onsager and Debye theory of dielectrics, molecular dipole moments, Beer’s law, Landolt’s rule, light scattering from macromolecules, quantum theory of radiation, magnetic susceptibility, introduction to NMR and ESR. Prerequisites: CH 342, MA 352.

646 Thermodynamics of Materials
Fundamental thermodynamic review, phase equilibrium, chemical reaction equilibrium, free energy, binary and ternary phase transformations, solution models and selected topics. Same as CHE 646. Prerequisite: CH 341 or equivalent.

647 Polymer Physical Chemistry
Includes an introduction to structure, properties and processing of polymers. Topics included are structural types, structure-property relationships, thermodynamics and
kinetics of polymerization and depolymerization, polymer characterization, thermodynamics of polymer solutions and blends, and mechanical evaluation of polymers. Prerequisite: CH 341 or equivalent.

661 Biological Macromolecules 3 hrs.
Detailed analysis of structures of proteins, nucleic acids, and complex polysaccharides. Prerequisite: CH 562.

699 Master's Thesis 3 or 6 hrs.
Required each term a student is enrolled and receiving direction on a master's thesis. Minimum of two terms required.

705 Selected Topics in Inorganic Chemistry 3 hrs.
Prerequisite: CH 600 and approval of instructor.

721 Selected Topics in Analytical Chemistry 3 hrs.
Prerequisite: CH 621 or equivalent and approval of instructor.

735 Selected Topics in Organic Chemistry 3 hrs.
Prerequisite: CH 632 and approval of instructor.

745 Selected Topics in Physical Chemistry 3 hrs.
Prerequisite: CH 643 and approval of instructor.

746 Solid State Chemistry 3 hrs.
Chemical properties of solids. Includes phase equilibria, chemical bonding in ionic and covalent crystals, thermodynamics of atomic defects, ionic conductivity in solids, corrosion, and introduction to surfaces and adsorption. Prerequisites: CH 342, MA 352.

765 Selected Topics in Biochemistry 3 hrs.
Prerequisites: CH 661 and approval of instructor.

780 Chemistry Seminar 1 hr.
Required during each term of residence.

799 Doctoral Dissertation 3, 6, or 9 hrs.
Required each term student is enrolled and receiving direction on a doctoral dissertation.

Computer Science Department

Professors: Davis (Chair), Hooper, Johannes, Shiva; Associate Professors: Amin, Hinke, Ranganath, Richards, Rochowiak, Ryan; Assistant Professors: Delugach, Graves, Israel, Meyer, Meehan, Moseley, Reed, Weiskopf, Ziebarth; Lecturers: Abi-Akar, Norris.

The computer science department offers courses leading to the B.S., M.S. and Ph.D. degrees with a major in computer science. In addition, an option in software engineering may be pursued at the M.S. level. This forms a curriculum which provides a grounding as well as advanced study in a variety of computing related disciplines. The undergraduate program is accredited by the Computer Science Accreditation Board (CSAB).

The department is connected to the campus wide network and owns or has ready access to a wide variety of computing facilities including: CRAY XMP/24, DEC VAX's, SPERRY 7000/40, TI Explorer, Symbolics and Sun workstations, personal computers and supporting equipment. The Microcomputing Laboratory in the department is used for instruction in logic design, computer architecture and microcomputer system design. It contains design stations employing state-of-the-art microprocessor systems.
Undergraduate Program

The computer science program at UAH prepares students to contribute to the rapidly changing world of computing. The program combines mathematical fundamentals with laboratory experience to build a base of practical knowledge. The program contains a Computer Science (CS) core and electives in a wide variety of areas, such as formal foundations, artificial intelligence, architecture, graphics, theory of program development, UNIX and languages, such as Ada, C, and Fortran. Students are required to complete the General Educational Requirements, the core computer science courses, a minor in mathematics and may elect to pursue a second minor in engineering. Computing lab fees are associated with most all computer science courses. Computing hardware labs are normally scheduled by the instructor and require a minimum of 2 hours per week outside of normal class hours.

Students with a major in CS will be required to have a C average in all CS and mathematics coursework in order to graduate. This includes coursework taken at other universities.

Computer Science Major

The minimum number of hours required for the B.S. degree with a major in computer science is 131, divided as follows:

General Education Requirements

- English Composition (EH 101 and EH 102) ................................................................. 6
- Origin and Development of Contemporary World (HY 101 and HY 102) ............................................. 6
- Foreign Language/Communication Skills
  - CS 108 and (two 200 level foreign language courses) or (CM 113 and EH 301) ......................... 9
- Literature (any one of the following sequences) EH 205 and EH 206; EH 205 and EH 241; EH 205 and EH 230 EH 206 and EH 240; EH 230 and EH 240 ........................................ 6
- Fine Arts (6 hours from two of the following options)
  - ARH 100 or ARH 101; ARS 101; MU 100 or MU 110; PHL 101, PHL 202, or PHL 311 ........................................ 6
- Social & Behavioral Sciences (6 hours in one discipline) Economics, Political Science, Psychology, Sociology .............................................. 6
- Mathematics (MA 153) ............................................................................ 3
- Laboratory Science
  - a. Physics 111, 112 .................................................................................. 8
  - b. Additional laboratory coursework (CH 121, 125 and CH 123, 126) or (BYS 112 and either BYS 113 or 114) or Engineering coursework with labs. ......................................................... 8

Computer Science Major Core:

CS 208, 214, 308, 309, 314, 317, 415, 424, 490, 499 ................................................................. 30

Computer Science Seminar - Ethics and Professionalism, CS 105 ........................................ 1

Computer Science Electives

Electives are designed to add in depth knowledge to the core courses areas and must be preapproved by the computer science advisor.

3 electives (two at 300 level or above, one at 400 level or above) ........................................... 9
Mathematics Minor
MA 154, 233, 244, 251, 385, 415, 440 or 352 ................................................................. 21

Electives (to bring total number of hours to 131) ................................................................. 12
Students may elect to earn a second minor in engineering by combining elective hours with 8
hours of engineering lab courses taken as part of the general education requirements. An
approved sequence of courses may be obtained from the departmental office or from the student’s
advisor. The elective hours may also be used to obtain a second major in mathematics. Consult
the Mathematical Sciences department for requirements.

Computer Science Minor

Students majoring in other fields may obtain a minor in computer science. A minimum of
22 hours of coursework is required for a minor in computer science and the request for a minor
should be initiated in the student’s major department. Typical course sequences are listed below;
other sequences should be pre-approved by the Computer Science department.


Computer Science (CS)
Undergraduate Courses

100 Introduction to Computers and Programming 3 hrs.
History of computation and the information age. Overall structure of computer
problem solving and method of constructing of computer solutions. Impact of computers
on the individual and society. Applications of computers in business, medicine, and humanities. Introduction to computer languages. Lab fee: Level 3.

105 Computer Science Seminar - Ethics and Professionalism 1 hr.
This seminar will cover issues associated with the ethical use of computers in the
current information age. Ethics, professionalism, software piracy, copywriting software,
ethical standards and the impact of computers on society will be covered. Familiarization with the local computing environment will also be covered.

108 Computer Science I with Pascal 3 hrs.
Overview of hardware and software components of computer systems. Techniques
of problem analysis and algorithm development. Principles of program design, coding,
and testing. Introduction to the Pascal programming language, with extensive expe-
rience in programming solutions to both numerical and non-numerical problems. Lab
fee: Level 4. Prerequisite: MA 121 or MA 143 (or Level III math placement).

113 Problem Solving using FORTRAN 3 hrs.
Introduction to the FORTRAN programming language. Components of algorithms
such as assignment, looping, conditional branching, and input/output. Problem
analysis and algorithm development. Basic algorithms for sorting, searching, table
look-up. Definition and use of functions and subroutines. Lab fee: Level 4. Prerequi-
site: MA 121 (or Level III placement).

208 Computer Science II - Data Structures with Pascal 3 hrs.
Continuation of CS 108, with emphasis on advanced features of the Pascal program-
ming language, including recursion, pointers, and files. Introduction to elementary
data structures such as linked lists, stacks, queues, and simple binary trees. Basic
search and sort algorithms. Additional instruction in the principles of good program-
214 **Introduction to Discrete Structures** 3 hrs.
Review of set algebra including mappings and relations. Algebraic structures including semigroups and groups. Elements of theory of directed and undirected graphs; Boolean algebra and propositional logic and applications of these structures to various areas of computer science. Lab fee: Level 4. Prerequisites: CS 108 and MA 151 or MA 153.

308 **Computer Organization and Assembly Language Programming** 3 hrs.

309 **Switching Theory** 3 hrs.
Boolean algebra, Boolean function minimization techniques, design and analysis of combinational circuits, design and analysis of sequential circuits, asynchronous circuits, timing and loading problems, designing with integrated circuits. Lab fee: Level 5. Prerequisite: CS 214 or MA 244.

311 **Advanced Software Development using COBOL** 3 hrs.

312 **System Software Development Using C** 3 hrs.
The role of major system software components and the interfacing and integration of these components in the process of program development and execution. The C language and the UNIX system will be used to develop the class of software. Lab fee: Level 4. Prerequisite: CS 208.

313 **Advanced Software Development Using FORTRAN** 3 hrs.
Introduction to the FORTRAN language. Programming in FORTRAN, programming support environments, basic principles of design and implementation using FORTRAN. Use of FORTRAN in a CRAY XMP environment. Optimizing and vectorizing compilers. Lab fee: Level 4. Prerequisite: CS 208.

314 **Data Organization and File Processing** 3 hrs.
Introduction to file structures, databases, and database management systems. Review of data structures: binary trees, B-trees, B*-Trees, and AVL Trees. Algorithms for traversing and balancing trees. Basic concepts and algorithms for inverted lists, multilists, index sequential, and hierarchical structures. Sequential and random access methods including record and file I/O. Lab fee: Level 4 Prerequisite: CS 308.

317 **Introduction to Design and Analysis of Algorithms** 3 hrs.
Review of basis data structures such as stacks, queues, lists, and binary trees. Introduction to complexity analysis of algorithms with emphasis on efficient methods for searching, sorting, finding spanning trees and shortest paths in graphs. Basic algorithm design techniques such as divide & conquer, dynamic programming, and backtracking. Introduction to the classification of problems by class; i.e., tractable, NP, intractable, and unsolvable. Introduction to the design of algorithms for execution on parallel machines. Lab fee: Level 4. Prerequisites: MA 244, CS 208 and one of CS 311, CS 312, CS 313, CS 314.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
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<tr>
<td>390</td>
<td>Unix Programming</td>
<td>3 hrs.</td>
<td>Strategies for the design and development of systems and programs in the Unix environment. Unix operating system fundamental concepts including file and terminal I/O, processes, interprocess communication and signals. Pattern searching, filter and pipes. Shell programming, including control flow and interrupt handling. Program and system development tools awk, C, make, sed, yacc, and others. Lab fee: Level 4. Prerequisite: CS 208.</td>
</tr>
<tr>
<td>403</td>
<td>Introduction to Formal Languages and Automata Theory</td>
<td>3 hrs.</td>
<td>Introduction to concepts and formalisms of formal languages and automata theory. Includes fundamental mathematical concepts, grammars and corresponding automata, and deterministic parsing of programming languages. Lab fee: Level 4. Prerequisite: CS 317.</td>
</tr>
<tr>
<td>415</td>
<td>Introduction to Digital Computer Design</td>
<td>3 hrs.</td>
<td>Logic design of functional digital units, design of computer subsystems: register transfer, bus structure, timing and control. Design of processor memory, arithmetic, and I/O units. Lab fee: Level 5. Prerequisites: CS 308, 309.</td>
</tr>
<tr>
<td>424</td>
<td>Introduction to Programming Languages</td>
<td>3 hrs.</td>
<td>Data and control structures and run-time considerations for modern programming languages such as Pascal, Ada, and LISP. Their applications in areas illustrating typical usage and characteristics. Lab fee: Level 4. Prerequisite: CS 317.</td>
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<tr>
<td>495</td>
<td>Selected Topics in Undergraduate Computer Science</td>
<td>3 hrs.</td>
<td>Courses will cover selected areas of Computer Science. Prerequisites: To be arranged with the instructor. Lab fee: Level 4.</td>
</tr>
<tr>
<td>499</td>
<td>Senior Project</td>
<td>3 hrs.</td>
<td>A combination of lectures on proven software development approaches, and team working sessions. Each student will participate in a sizable, complex software development project based on a team approach. Each team will be required to provide oral and written documentation on their work. Lab fee: Level 4. Prerequisite: CS 317.</td>
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Graduate Program

Computer Science is a key ingredient in almost all technical endeavors undertaken today. The modern computer scientist must be trained to resolve a wide variety of issues relating to the applications of computers to complex problems. The graduate program in computer science employs practical applications as well as theoretical fundamentals to prepare the student for contributions in a university, industrial or government environment.

Emphasis Areas

Students pursuing graduate programs are allowed to tailor their studies to meet a variety of needs. The program requires the completion of core courses augmented with in-depth studies in several areas of interest. Specific areas in the department include: theoretical computer science, languages and systems, software engineering, artificial intelligence, image processing and vision systems, computer architecture and supercomputer applications.

Theoretical Computer Science

These courses develop the theoretical aspects of computer science and provide a basis and framework for further research either in theoretical computer science or in another research area having a theoretical basis. Emphasis may be achieved by selecting from among the following course offerings:

- CS 603 Formal Languages and Automata Theory
- CS 617 Design and Analysis of Algorithms
- CS 703 Theory of Programming Languages
- CS 717 Advanced Algorithm Design and Analysis

Languages and Systems

The languages and systems area includes instruction in programming languages, systems programming and data base systems, as well as their use in problem solutions.

- CS 590 Programming Environments with UNIX
- CS 612 Compiler Design
- CS 624 Programming Languages
- CS 645 Interactive Computer Graphics
- CS 687 Data Base Systems
- CS 690 Operating Systems
- CS 787 Advanced Data Base Systems
- CS 790 Advanced Operating Systems

Software Engineering

The difficulties in managing, specifying, designing and testing large software systems are many, resulting frequently in software being completed late, with many errors, and with cost overruns. The Software Engineering area is a study of this very complex software development process. The requirements for the option in software engineering are described in the Master of Science degree requirements section. Courses in this area include the following:

- CS 550 Ada Program Support Environments
- CS 551 Object Oriented Software Development
- CS 555 Theory of Program Development
- CS 650 Software Engineering
- CS 651 Software Requirements and Design Methodologies
Artificial Intelligence

Artificial intelligence allows the building of computer-based systems that require minimal human interaction with operational details; are easy to use through enhanced communication and understanding abilities; are autonomous in significant roles of their operation; can adapt to environmental variations; and can describe their own operations and justify their solutions, decisions and advice. These applications are numerous in areas such as: perception (computer vision, speech understanding, and tactile sensation); robotics; natural language processing; and expert systems. The courses listed below cover the fundamentals of artificial intelligence.

CS 530 Introduction to Artificial Intelligence
CS 537 Neural Networks
CS 630 Artificial Intelligence
CS 635 Computational Models of Cognition
CS 730 Expert Systems and Heuristic Programming

Image Processing and Vision Systems

For more than a decade, research in artificial intelligence has focused on the problem of duplicating human intelligence in machines so that the machines can perceive and understand the environment through visual and other patterns, and then respond with appropriate actions. Such systems have many industrial, military and space applications. The following course sequence covers theory, computational algorithms, and architecture for the design and development of pattern recognition and vision systems.

CS 640 Automatic Pattern Recognition
CS 642 Computer Processing of Digital Images
CS 735 Computer Vision
CS 742 Image Processing Algorithms and Architectures

Computer Architecture

The courses offered in the area of Computer Architecture cover the organization, architecture and design of digital computer systems from high level conceptual design to gate level implementation. The area is interdisciplinary with augmenting courses from the Electrical and Computer Engineering Department. The main concentration areas are: logic design and digital computer hardware design; advanced computer architectures; distributed processing; and microprocessors and bit slice devices. Suggested courses in this area:

CS 586 Microprocessor Architectures
CS 613 Computer Architectures
CS 670 Computer Networks
CS 686 Bit Slice Microcomputer Systems
CS 713 Distributed Processing Systems
CS 780 Computer System Reliability

Supercomputer Applications

The application of advanced high speed processors to problems is having revolutionary impact on the way solutions must be structured. This area provides instruction in the applications of high speed (class VI or greater) machines to the solution of complex problems. Areas include vectorization, parallel algorithm development, advanced computing architectures,
numerical analysis and specific solution applications. Courses in this specialty will be interdisciplinary; including mathematics, physics and engineering in addition to a computer science core. Specific course content can be tailored to student needs and will be planned individually with the student's advisor. Computer Science courses in this area include the following:

- CS 646  Computer Geometry Modeling
- CS 647  Numerical Grid Generation
- CS 660  Large Scale Scientific Computing
- CS 770  Supercomputing Applications in Fluid Dynamics

**Admission Requirements**

Requirements for admission to the Computer Science graduate degree program are in addition to those of the School of Graduate Studies. A score of 650 is required on the quantitative portion of the GRE for unconditional admission. Preference will be given to students scoring greater than 1100 on the quantitative and verbal portions of the exam. The advanced portion of the GRE in Computer Science is required. The MAT or GMAT are not acceptable as substitutes for the GRE.

**Prerequisites:**

Prerequisites for the graduate program in computer science are the following:

**Mathematics:**
- MA 153  Calculus I
- MA 154  Calculus II
- MA 233  Calculus III
- MA 244  Introduction to Linear Algebra
- MA 385  Introduction to Probability

**Computer Science:**
- CS 108  Computer Science I with Pascal
- CS 208  Computer Science II-Data Structures with Pascal
- CS 214  Introduction to Discrete Structures
- or MA 440  Algebraic Structures with Applications
- CS 317  Introduction to Design and Analysis of Algorithms or
- CS 517  Data Organization and Algorithm Analysis
- CS 424  Introduction to Computer Architecture
- CS 490  Systems Software
- CS 513  Introduction to Computer Architecture or
- CS 309  Switching Theory plus
- CS 415  Introduction to Digital Computer Design

**Master of Science**

Students applying for the Master's program are expected to have an undergraduate background in CS. Those students lacking adequate background will be asked to complete the above prerequisites before being admitted. At least a B average must be maintained in the prerequisites. Any prerequisite completed with a grade of C or less must be repeated prior to admission into the master's degree program.
Unconditional Admission

Students applying to the M.S. program will be given unconditional admission if they meet all the requirements of the School of Graduate Studies and of the Computer Science Department including prerequisite courses listed above.

Conditional Admission

Conditional admission may be given to students who in the judgment of the department have the potential for successfully completing graduate work but who do not meet all of the requirements for admission.

Degree Requirements

Computer Science

The Master of Science Degree is conferred under Plan I or Plan II. All students must take the following four core courses: CS 613 (Computer Architecture), CS 617 (Design and Analysis of Algorithms), CS 624 (Programming Languages), and CS 690 (Operating Systems). Six hours of course work in a minor area are also required. The minor may be within Computer Science or other areas such as Administrative Science, Electrical Engineering, Engineering Management, Mathematics, and Operations Research.

Plan I. A minimum of 24 semester hours of coursework and the writing of an acceptable thesis. Coursework includes: (a) 18 semester hours of graduate credit in core and major elective computer science courses, and (b) six hours of courses in an approved minor area. In addition, six hours of thesis credit must be earned. Students must pass a comprehensive oral final examination covering the thesis and coursework.

Plan II. A minimum of 33 semester hours, including: (a) 27 semester hours of graduate credit courses in core and computer science electives, and (b) six semester in an approved minor area. Students must pass a written examination on the core courses, and an oral examination on the coursework. The written examination can be taken anytime after completion of 21 hours of graduate coursework.

A program of study must be planned before completing 12 semester hours of study. The plan must be made in consultation with a member of the computer science faculty assigned by the department chairman as an advisor. The program of study cannot contain more than three hours of special topics courses without approval of the department chairman. The program of study is approved by the Chair of the Computer Science Department, the Dean of the College of Science, and the Dean of the School of Graduate Studies. After approval of the program of study, students may not substitute courses without prior approval of an advisor.

Software Engineering Option

The software engineering option will be available under Plan I only. This option requires 36 hours for completion and consists of the twelve hours of core courses listed above, eighteen hours of required software engineering courses and a six hour minor. The minor areas may include engineering courses in areas such as simulation, modeling, product assurance, acquisition management, and reliability, or courses in software engineering practice. The software engineering courses include the following set of courses. In selecting from this set, you must include at least one advanced software engineering practice course.
CS 550  Ada Program Support Environments
CS 650  Software Engineering
CS 651  Software Requirements and Design Methods
CS 652  Software Testing and Reliability
CS 653  Software Project Management and Quality Assurance
CS 657  Advanced Software Engineering Practice I
CS 658  Advanced Software Engineering Practice II
CS 659  Advanced Software Engineering Practice III

Students will also be required to be familiar with Ada as a development language and will be required to have CS 350 or equivalent as a prerequisite. A final oral examination will be given on all coursework.

Doctor of Philosophy

Admission Requirements

The admission policies for the Ph.D. program in Computer Science follow the general policies of the School of Graduate Studies and Computer Science Department as described above. An applicant’s admission request will be reviewed in light of preparatory coursework, GRE scores, any supporting information, and general expectation of completing the degree. Students requiring a large amount of prerequisite coursework will not normally be admitted to the program until the courses have been completed. Graduate admission requests for the Ph.D. program will be reviewed once per term. This will normally be done two weeks following the application deadline. Applicants are encouraged to submit supporting recommendation letters and an indication of research interests and study plans. Specific requirements are available from the Computer Science department office. Requests for admission will be evaluated according to the following guidelines.

Unconditional Admission

Unconditional admission will be given to applicants who meet all of the requirements of the School of Graduate Studies and Computer Science Department for unconditional admission and have completed the M.S. core courses. Students showing exceptional promise who desire to pursue the Ph.D. full-time may be admitted to the program after completing a Bachelors Degree in Computer Science.

Conditional Admission

Conditional admission may be given to applicants who do not meet all of the requirements of the School of Graduate Studies and the Computer Science Department but who show high potential for completing the degree requirements.

Degree Requirements

The general requirements for the Ph.D. degree comply with those of the School of Graduate Studies. The requirements include a preliminary examination, completion of coursework, a qualifying examination, completion of significant research documented in a dissertation and the dissertation defense.
Major/Minor Subjects

A minimum of 60 hours of graduate course credit plus 18 dissertation credit hours are required for the Ph.D. in Computer Science. The program of study will consist of 36 hours in the major, 24 hours in a minor, and must be approved by the student’s supervisory committee.

The program must include CS 603, CS 613, CS 617, CS 624, CS 630 and CS 690 and must have a coherent area of emphasis, of which at least 6 semester hours must be at the 700 level. At least 9 semester hours of graduate level mathematics must also be included as part of the minor.

Preliminary Examination

Students will be required to take a preliminary examination over the following core areas: formal languages, computer architecture, algorithms, programming languages, operating systems and artificial intelligence. The examination should be taken at the earliest opportunity upon completion of the core coursework. Successful completion of the examination will provide evidence to the student’s ability to continue to pursue the Ph.D. degree. The examination can be taken no more than twice.

Admission to Candidacy

To be admitted to candidacy for the Ph.D. degree, students must first pass the qualifying examination and have an approved research proposal. The qualifying exam can cover any aspect of the student’s program and is taken after completion of the student’s coursework and upon recommendation of the student’s supervisory committee. The qualifying examination may be taken no more than twice; it is designed to test students’ fitness for pursuing a research project in his/her chosen areas and to test their general knowledge of computer science. After completion of the qualifying exam the student will present a research proposal to the supervisory committee.

Residency Requirements

In order to meet the residency requirements, a student must complete 6 or more graduate hours per term for three consecutive terms at UAH. The Summer term may be ignored, if desired, in establishing three consecutive terms. No more than 6 hours taken as part of the residency requirements may be dissertation credit.

Dissertation

A significant portion of the dissertation must be submitted for publication in an approved journal with international circulation prior to defense of the dissertation. A public defense of the dissertation is required.

SPECIAL COURSES

The following courses serve as prerequisites for students entering the Computer Science graduate program. They are not open to Computer Science undergraduates and can not be taken for credit by Computer Science undergraduate and graduate majors.

513 Introduction to Computer Architecture 3 hrs.
Review of combinational and sequential logic design, register transfer concept, logic design of memory, arithmetic unit, control unit, and I/O system of simple computer. Architectural trade-offs; representative computer architectures including a micro-, mini-, and large-scale computer system. Lab fee: Level 5.

517 Data Organization and Algorithm Analysis 3 hrs.
Review of basic data structures such as stacks, queues, lists, B-Trees, and binary trees. Overview of file structures and access methods. Introduction to complexity analysis of algorithms. Basis algorithm design techniques such as divide & conquer, dynamic programming, and backtracking. Introduction to the classification of problems by class; i.e., tractable, NP, intractable, and unsolvable. Lab fee: Level 4. Prerequisite: CS 208.
Graduate Courses (CS)

Courses numbered between 530 and 599 (inclusive) may be taken for undergraduate or graduate credit with prior approval of the student’s advisor. To receive credit toward a graduate degree, a student must attain a minimum grade of B in all core courses and in each computer science course numbered less than 600. In addition, students must maintain a minimum of B average in all CS graduate courses.

530 Introduction to Artificial Intelligence 3 hrs.
Basic introduction to AI concepts and methods for problem solving, heuristic search, planning, hypothesis formation, modeling and knowledge representation, knowledge acquisition (learning), and AI’s programming methodologies and tools. Applications of AI in areas of automatic programming, theorem proving, game playing, machine vision, natural language systems and robots. Lab fee: Level 4. Prerequisites: CS 317, CS 424.

537 Neural Networks 3 hrs.
The purpose of this course will be to learn the fundamentals of neural networks. Specific problems will be examined to contrast the connectionist approach to functionalism. The most common neural net models will be implemented and applied to various machine learning applications. Prerequisite: CS 530.

550 Ada Program Support Environments 3 hrs.
A study of advanced development concepts and support tools centered around Ada as the implementation language. Design and implementation concepts as part of the software life cycle. Lab Fee: Level 4. Prerequisite: CS 350 or equivalent introductory course in Ada.

551 Object Oriented Software Development 3 hrs.
Object oriented methods and design concepts, languages and systems for object oriented development, object oriented programming environments, application of object oriented techniques. Lab fee: Level 4. Prerequisite: CS 208.

555 Theory of Program Development 3 hrs.
Propositional and predicate calculi, reasoning about programs, weakest precondition, program development, developing invariants, efficiency consideration, and program documentation. Lab fee: Level 4. Prerequisite: CS 424.

586 Microprocessor Architecture 3 hrs.
Evolution of microprocessors. Software aspects: registers and register organization, instruction sets, addressing modes, assembler and assembler directives. Hardware aspects: redundant bus concepts, clock circuits, memory, parallel and serial input/output interfaces, programmed I/O, interrupt mode I/O, direct memory access. Survey of current microprocessor technology. Lab fee: Level 5. Prerequisites: CS 513, or CS 309 or CS 415.

590 Programming Environments with UNIX 3 hrs.
Advanced strategies for the design and development of systems and programs in the Unix environment. Emphasis on automated tool and system development using Unix tools. Parallel and Supercomputer issues as treated by UNIX and C. Advanced Shell concepts and programming including control flow and interrupt handling. Process and interprocess communications. Lab fee: Level 4. Prerequisite: CS 390 or two years experience in Unix.

595 Selected Topics in Computer Science 3 hrs.
Courses in special topics requested by students Prerequisites: Approval and consent of instructor.
Formal Languages and Automata Theory 3 hrs.

Compiler Design 3 hrs.
Compilation of expressions and statements; organization of a compiler including compile-time and run-time symbol tables, lexical analysis, syntax analysis, optimization, object-code generation and error diagnostics. Compiler writing tools. Lab fee: Level 4. Prerequisites: CS 624 and 403 recommended.

Computer Architectures 3 hrs.
Array, parallel, and pipeline architectures; multiple processor systems, and concepts of data flow and high-order language architectures. Performance evaluation, selected architectures including micro-, mini-, and large-scale computer systems. Lab fee: Level 4. Prerequisite: CS 415 or CS 513.

Design and Analysis of Algorithms 3 hrs.
Strategies of algorithm synthesis and analysis. Design methodologies of classical algorithm categories such as: divide-and-conquer, greedy method, dynamic programming, search and traversal, back-tracking, and branch-and-bound. Computational complexity and important theoretical results from lower-and upper-bound studies, NP-hard, and NP-complete problems. Lab fee: Level 4. Prerequisite: CS 317 or CS 517.

Programming Languages 3 hrs.
Definition and classification of programming languages. Concepts, designs, and use of languages, such as block-structured, string-processing, and list-processing languages. Unified approach to general-purpose languages, comparative analysis of languages. Recent developments, syntax, and semantics. Lab fee: Level 4. Prerequisites: CS 424 and CS 317 or CS 517.

Artificial Intelligence 3 hrs.
A rigorous treatment of the issues and ideas of Artificial Intelligence. Topics include knowledge representation, automated deduction, search control, machine learning, and meta-level architectures. Current topics and reading in AI. Lab fee: Level 4. Prerequisite: CS 530.

Computational Models of Cognition 3 hrs.
Computational models of information processing covering topics of current interest to both Artificial Intelligence and Cognitive Psychology. Use of computer simulations to test psychological theories. Application of psychological research to building AI systems. Lab fee: Level 4. Prerequisite: CS 630.

Automatic Pattern Recognition 3 hrs.
Discriminant analysis, maximum likelihood decisions, deterministic and non-deterministic approaches for trainable classifiers, preprocessing and feature extraction, clustering, syntactic pattern recognition. Pattern recognition in image analysis. Lab fee: Level 4. Prerequisites: MA 244, 385.

Introduction to image processing systems; sensing, sampling and quantization; image transforms; image enhancement and restoration; image segmentation, and description; image correlation; image sequence analysis; practical applications of image processing. Lab fee: Level 4. Prerequisites: MA 244, MA 385.

322
Interactive Computer Graphics 3 hrs.
Interaction graphics application program fundamentals. User-friendly interactive
dialogue design, hardware and software concepts-windowing, clipping, and logical
interaction handling; data structures and geometric transformations useful for modeling objects, especially in hierarchical form; device independent algorithms as well as shading, texturing and models for representing color in realistic synthetic photographs; evolution of display processor architecture with respect to functional distribution. Lab fee: Level 5. Prerequisites: CS 513, CS 317, MA 244 or equivalent.

Computer Geometry Modeling 3 hrs.
Numerical and computer representation of curves and surfaces, solid geometry modeling and management aspects of geometric data. Computer procedures associated with coordinate transformation, curve and surface design, orientation, cubic-tension-B-splines, Bezier curves/surfaces, and interpolation methods. Discuss graph-based and Boolean models and concepts of constructive application to Computational Fluid Dynamics CAD/CAM/CAE, Robotics, Animation, Image Processing and Computer Graphics. Lab fee: Level 4. Prerequisites: MA 515 and CS 313, or equivalents.

Numerical Grid Generation 3 hrs.
Introduction and applications, boundary conforming coordinate systems, computer representation of transformation relations, stretching and blending functions, algebraic and variational generation systems, Elliptic, Parabolic and Hyperbolic Generation Systems, conformal mapping and orthogonal grid generation strategies and comparisons. Develop algorithms associated with generation systems. Lab fee: Level 4. Prerequisite: CS 646 or equivalent.

Software Engineering 3 hrs.
Life-cycle stages of a software system, including requirements, design, implementation, testing, and maintenance. Project management issues. Software design, structured programming, and program testing techniques in software system development. Projects to illustrate software engineering advancements. Lab fee: Level 4. Prerequisite: CS 624.

Software Requirements & Design Methodologies 3 hrs.
Importance of early phases of software development, formal methods, computer-aided tools, methodology and tool assessment, rapid prototyping, requirements and design specifications. A significant project will be part of the course. Lab fee: Level 5. Prerequisite: CS 650.

Software Testing and Reliability 3 hrs.
Goals of testing, testing methods, quality standards, automated testing tools, test planning, results evaluation, retesting, reliability models. Lab fee: Level 5. Prerequisite: CS 650.

Software Project Management and Quality Assurance 3 hrs.
Software life cycle, software risk reduction, software productivity, planning, organizing, directing and controlling software projects, software tools for cost estimation, configuration and data management, software quality and its impact upon development cycle, quality metrics. Lab fee: Level 5. Prerequisite: CS 650.

Advanced Software Engineering Practice I, II, III 3 hrs.
A series of structured software development experiences addressing the application of software engineering principles to large scale software development. Students will complete the software development life cycle for a software product. This ranges from initial requirements definition through maintenance of a delivered product. Lab fee: Level 4. Prerequisites: CS 651,652,653.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>660</td>
<td>Large Scale Scientific Computing</td>
<td>3 hrs.</td>
<td>Advanced techniques to produce optimal algorithms for scientific and engineering applications. Vector Processing, Parallel Processing and efficient memory management techniques applied to large-scale linear full and sparse equations solvers. Sparse elimination and software for sparse matrix computations. Applications involving sparse matrices. Lab fee: Level 4. Prerequisites: MA 515 and CS 313 or equivalents.</td>
</tr>
<tr>
<td>670</td>
<td>Computer Networks</td>
<td>3 hrs.</td>
<td>Computer network structures and architectures, network topology, the ISO reference model: layers, protocols, and interfaces, local area networks, descriptions of ARPANET, SNA and DECNET. Lab fee: Level 4. Prerequisite: CS 613.</td>
</tr>
<tr>
<td>686</td>
<td>Bit Slice Microcomputer Systems</td>
<td>3 hrs.</td>
<td>Digital design methods: Microprogramming and microprogrammed control units; ALU/ Register slices; Microprogram sequencers; Bit slice support chips: program control unit, priority interrupt controller, status and shift control unit, etc.; Programmable logic: PLA, PAL; Firmware design. Lab fee: Level 4. Prerequisite: CS 586.</td>
</tr>
<tr>
<td>690</td>
<td>Operating Systems</td>
<td>3 hrs.</td>
<td>Techniques of constructing operating system control programs including management of system, jobs, and data; multiprogramming, multiprocessing, and timesharing systems. Lab fee: Level 4. Prerequisite: CS 617.</td>
</tr>
<tr>
<td>695-698</td>
<td>Selected Topics in Computer Science</td>
<td>3 hrs.</td>
<td>Courses in special topics requested by students. Prerequisite: approval of instructor.</td>
</tr>
<tr>
<td>699</td>
<td>Master's Thesis</td>
<td>3 hrs.</td>
<td>Required each term student is working and receiving direction on master's thesis. Maximum of 9 hours of credit upon successful completion of master's thesis.</td>
</tr>
<tr>
<td>703</td>
<td>Theory of Programming Languages</td>
<td>3 hrs.</td>
<td>Syntactic analysis and semantic interpretation of programming languages based on research and results in formal languages and associated compiler techniques. Identification of research directions and potential research projects in programming languages. Lab fee: Level 4. Prerequisite: CS 603.</td>
</tr>
<tr>
<td>713</td>
<td>Distributed Processing Systems</td>
<td>3 hrs.</td>
<td>Computer network configurations, communication protocols, and architectural tradeoffs; distributed data bases; operating systems and software issues. Reconfiguration, recovery, and reliability, specification and design of distributed systems: case studies. Lab Fee: Level 4. Prerequisites: CS 670 and 690.</td>
</tr>
<tr>
<td>717</td>
<td>Advanced Algorithm Design and Analysis</td>
<td>3 hrs.</td>
<td>Parallel algorithms, combinatorial algorithms, approximation algorithms for NP-complete problems, computational complexity. Distribution of algorithms across complex architectures. Lab fee: Level 4. Prerequisite: CS 617.</td>
</tr>
<tr>
<td>730</td>
<td>Expert Systems and Heuristic Programming</td>
<td>3 hrs.</td>
<td>Expert system concepts and their architectures. Languages and tools for knowledge engineering. Heuristic versus algorithmic methods, treatment of heuristics as used in expert systems, and heuristic programming techniques. Class and individual projects to illustrate concepts. Lab fee: Level 5. Prerequisites: CS 624, 630.</td>
</tr>
</tbody>
</table>
Computer Vision 3 hrs.
The construction of explicit, meaningful descriptions of physical objects from images. Generalized and segmented images and image-like entities, geometric structures expressed as quantitative models of images. Relational structures using knowledge bases and symbolic descriptions and understanding via matching, inference and goal achievement. Lab fee: Level 5. Prerequisites: CS 530, CS 640, CS 642.

Image Processing Algorithms and Architectures 3 hrs.
Algorithms and data structures for image enhancement, segmentation, object recognition and image sequence analysis; real-time versus non real-time image processing; computer architectures for fast image processing; cellular logic array processors, distributed array processors, systolic array processors; binary array processors, etc. Lab fee: Level 5. Prerequisites: CS 642, CS 613.

Advanced Software Engineering 3 hrs.
Experimental framework of software engineering. Design of experiments to evaluate different methods and techniques in software development, operation, and maintenance. Quality and productivity issues. Review of current literature. Student-design software engineering experiments as course project. Lab fee: Level 4. Prerequisite: CS 650.

Supercomputing Applications in Fluid Dynamics 3 hrs.
Advanced numerical algorithms and their applications to complex fluid dynamics problems. Algorithmic strategies for efficient utilization of vectorizing compilers and multiple CPU architectures. Memory Management techniques and efficient Input/Output methodologies. Lab fee: Level 4. Prerequisites: CS 660 and ME 653.

Computer System Reliability 3 hrs.
Overview of reliability theory; hardware fault diagnosis, and fault tolerance; notion of software reliability, techniques for program specification and program validation; system reliability. Lab fee: Level 4. Prerequisites: CS 660 and ME 653.

Advanced Database Systems 3 hrs.
Advanced topics in data bases. Introduction to distributed data bases and current research in expert data bases. Query processing, concurrency control, security and recovery issues in both centralized and distributed data bases. Lab fee: Level 4. Prerequisite: CS 687.

Advanced Operating Systems 3 hrs.
Time-sharing and distribution queuing models, models of program behavior, concurrency, multilevel memory allocation and paging, algorithms, analysis of file structures and I/O scheduling. Measurement techniques and analysis. Lab fee: Level 5. Prerequisite: CS 690.

Advanced Selected Topics 3 hrs.
Courses in special topics requested by students. Prerequisite: Approval of instructor.

Doctoral Dissertation 3-6 hrs.
Required each term student is enrolled and receiving direction on doctoral dissertation. Maximum of 18 hours credit.
Mathematical Sciences Department

Professors Chang, Gibson (Chair), Padulo, Slater; Associate Professors Ames, Cook, Dow, Forte, Friedman, Howell, McNider, Morales, Roach, Siegrist; Assistant Professors Adebiyi, Cobb, Elshamy, Epperson, Fehribach, Li, Phanord; Assistant Research Professor Reynolds; Lecturers Presson, Reeder.

Undergraduate Programs

The mathematical sciences faculty offers courses in mathematics and statistics for a Bachelor of Arts or Bachelor of Science degree in mathematics, a Bachelor of Arts or Bachelor of Science degree in mathematics education, and a minor or second major in mathematics for students majoring in other areas of study. Courses also satisfy individual needs to supplement other areas of study and to satisfy general education requirements (GER).

General Education Requirements

Students who are not planning to continue in mathematics but who need 3 to 9 hours to satisfy GER should make their choice from the sequence MA 105, 143, 151, 244, ST 281, MA 333, and 385 beginning with the course indicated by their placement level.

Students who plan to continue in mathematics and need 3 to 9 hours to satisfy GER should make their choice from the sequence MA 119, 121, 153, 154, 233, 244, beginning with the course indicated by their placement level.

Placement

No student may enroll in his first MA course at UAH before determination of his placement level. Students are placed at the appropriate level according to their high school mathematics background, their ACT scores in mathematics, their previous college credit (if any), and a placement test.

Students with various placement levels must begin their MA courses for credit as follows: Level I — MA 105 or 119; Level II — MA 121 or 143; Level III — MA 151 or 153. No credit can be obtained for an MA course below a student’s placement level, and no more than 3 hours credit is awarded at each level.

Mathematics Major

All majors in mathematics must include MA 153, 154, 233, 244, 251, 440, and 452 (basic core - 21 semester hours). Only MA courses numbered 153 or above may be included in a mathematics major, and an overall average of C is required for all University of Alabama in Huntsville MA courses included in a mathematics major. Information on other MA course requirements are given in Curricula I and II below. Students who think that substitutions in those curricula can produce a program better suited to their needs should consult their faculty advisor about the feasibility of such substitutions. All MA electives must be approved by the student’s faculty advisor prior to registering for the courses. Majors in mathematics must also include CS 108, PH 111 and 112, and ST 281.

Mathematics Minor or Second Major

Students majoring in other academic areas who wish to minor in mathematics may select in consultation with and approval of the mathematical sciences faculty at least 21 semester hours of appropriate courses in mathematics, including 6 semester hours in courses numbered 300 or above. Only MA courses numbered 153 or above may be included in a mathematics minor, and an overall average of C is required for all University of Alabama in Huntsville MA courses included in a minor. A typical mathematics minor consists of MA 153, 154, 233, 244, 251, and two approved MA courses numbered above 300. All minors must include MA 153 and 154.
two approved MA courses numbered above 300. All minors must include MA 153 and 154.

Students majoring in other academic areas who wish to obtain a more solid background in mathematics than is provided by a minor may pursue a second major in mathematics rather than a minor in mathematics. The courses required for the second major are used to replace the minor courses and some of the free electives in the requirements for programs of study leading to a B.A. or B.S. degree.

**Curriculum I**

B.A. or B.S. degree with a major in mathematics

| Mathematics - MA basic core, MA 352, 425 and 9 hours of electives numbered 300 or above, including at least one 500 level course, preapproved by student's mathematics advisor | 36 |
| Computer Science - CS 108 | 3 |
| Physics - PH 111, 112 | 8 |
| Statistics - ST 281 | 3 |
| Minor | 21-24 |
| General Education Requirements and Electives (to total 128 semester hours) | 54-57 |

GER for the B.A. and B.S. degrees are listed in the academic information section.

**Curriculum II**

B.A. or B.S. degree with a major in mathematics that meets requirements for an Alabama Class B Middle/Junior High School Teacher's Certificate or an Alabama Class B High School Teacher's Certificate.

| Mathematics - MA basic core, MA 333, 385 and 6 hours of electives numbered 300 or above, including at least one 500 level course, preapproved by student's mathematics advisor | 33 |
| Computer Science - CS 108 | 3 |
| Physics - PH 111, 112 | 8 |
| Statistics - ST 281 | 3 |
| Professional Education Courses | 33 |
| General Education Requirements and Electives | 48 |

**NOTES:**

1. See Education Department section for general education requirements and professional education courses.
2. Students pursuing this curriculum should consult with the Education Department early in their program.

**Curriculum III**

B.A. or B.S. degree with a double major in mathematics education and elementary education. This plan meets requirements for an Alabama Class B Elementary Teacher's Certificate. Mathematics Education (minimum requirements applicable to this program only.) MA 153, 154, 233, 244, 333, 385, 440 and two MA electives numbered 300 or above which have been preapproved by student's mathematics advisor | 27 |

**NOTES:**

1. See Education Department section for general education requirements and professional
2. Students pursuing this curriculum should consult with the Education Department early in their program.
3. Students who elect this curriculum will not be adequately prepared for graduate study in mathematics.
4. This curriculum will probably require more than the minimum total of 128 hours.

Appropriate Minors for Mathematics Major
A student who majors in mathematics is strongly encouraged to select a minor in science or engineering. Typically, such a student minors in computer science, physics, chemistry, or engineering, but other options are available. Any minor must include at least 21 hours in one discipline, with a minimum of 6 hours at 300 level or above. All courses in a minor must be approved by the department concerned and the student's mathematics faculty advisor.

Mathematics (MA)

NOTE:
1. No student may receive more than 6 hours credit for MA courses numbered below 150 or more than 3 hours credit for MA courses numbered below 120.
2. Students placed at Level II may receive no more than 3 hours credit for MA courses numbered below 150.
3. Students placed at Level III will receive no credit for MA courses numbered below 150.
4. Students with deficiencies of high school algebra or high school geometry must remove these deficiencies before enrollment in MA courses numbered 100 or above.
5. No student may enroll in his first MA course at UAH before determination of his placement level.

004 Basic Algebra No credit
For students with a deficiency in high school credit in algebra or who need an algebra review.

033 High School Geometry No credit
For students with a deficiency in high school credit in geometry. Prerequisite: Basic algebra.

105 College Algebra 3 hrs.
Rational expressions, roots and radicals, algebraic and absolute value equations, inequalities, relations, functions, inverse functions and their graphs, systems of equations, conic sections, exponential and logarithmic functions. No credit given to students who have received credit for another MA course or who place at Level II or above. Prerequisite: Level I placement or removal of mathematics deficiencies.

119 Precalculus I 3 hrs.
Should be taken only by students who are going on to the calculus sequence (MA 153, 154, ...). Real numbers systems, exponents, radicals, factoring, absolute value, inequalities, function notation, functions, inverse functions, graphing techniques, polynomial and rational functions, operations with complex numbers, conic sections, and theory of equations. No credit given to students who have received credit for another MA course or who place at Level II or above. Prerequisite: Level I placement or removal of mathematics deficiencies.

121 Precalculus II 3 hrs.
Should be taken only by students who are going on to the calculus sequence (MA 153, 154, ...). Exponential and logarithmic functions, trigonometric functions of angles and real numbers, graphing trigonometric functions, inverse trigonometric functions,
solving trigonometric equations, verifying identities, laws of sines and cosines, vectors, trigonometric form of complex numbers, DeMoivre's theorem, summation notation, arithmetic and geometric sequences and series. No credit given to students who have successfully completed an MA course numbered above 121 or who place at Level III. Prerequisite: Level II placement or MA 119 with a grade of C or better.

143 Finite Mathematics 3 hrs.
Linear models, matrix theory, linear programming, graphical and simplex methods of solving systems, sets, counting, probability, decision theory and algebra review. No credit given to students who have successfully completed MA 121 or a higher level MA course or who place at Level III. Prerequisite: Level II placement or MA 105.

151 Survey of Elementary Calculus 3 hrs.
Limits, continuity, derivatives, chain rule, derivative tests, logarithm and exponential functions, applications of the derivative, antiderivatives, fundamental theorem of calculus, applications of the integral. No credit given to students who have received credit for any other calculus course. Designed for students who do not plan further study in calculus. Students planning to continue in calculus should begin with MA 153 instead of this course. Prerequisite: Level III placement or MA 143.

153 Calculus I 3 hrs.
Limits, continuity, derivatives, differentials, chain rule, implicit differentiation, applications of the derivative, conic sections. Designed for students who plan further study in Calculus. Prerequisite: Level III placement or MA 121 with a grade of C or better.

154 Calculus II 3 hrs.
Definite and indefinite integrals, exponential and logarithmic functions, trigonometric functions, hyperbolic functions, l'Hopital's Rule, techniques of integration, improper integrals, applications of the integral. Prerequisite: MA 153 with a grade of C or better.

233 Calculus III 3 hrs.
Polar coordinates, sequences and series, vectors and analytic geometry in three dimensions, vector-valued functions. Prerequisite: MA 154 with a grade of C or better.

244 Introduction to Linear Algebra 3 hrs.
No credit given to students who have successfully completed either MA 440 or MA 502. Such students must substitute MA 544. Systems of linear equations, matrices, matrix operations, determinants, vector spaces, bases, dimension of a vector space, inner product, Gram-Schmidt process, linear transformations, change of basis, similar matrices, eigenvalues and eigenvectors, diagonalization, symmetric matrices, and applications. Prerequisite: MA 233 or MA 143, 151.

251 Calculus IV 3 hrs.
Partial differentiation, chain rule, directional derivatives, tangent plane, Lagrange multipliers, multiple integration, vector fields, line integrals, Green's Theorem, divergence and curl, surface integrals. Prerequisite: MA 233.

333 Introduction to Geometry 3 hrs.
Axiomatic development of geometry. Introduction to non-Euclidean geometries with emphasis in elliptic and hyperbolic geometries. Selected topics in Euclidean geometry. Prerequisite: MA 244 or approval of instructor.

352 Introduction to Differential Equations 3 hrs.
First-order differential equations, linear differential equations with variable and constant coefficients, variation of parameters, Laplace transforms, series solutions, selected applications. Prerequisite: MA 251. MA 244 recommended before taking this course.
355 Mathematical Techniques in Computer Graphics 3 hrs.
A study of some of the mathematics used in computer graphics. Rotations, translations, viewing transformations including orthographic and perspective projections, homogeneous coordinates, hidden line and surface removal. Students participate in computer demonstrations and projects illustrating the techniques discussed in class. Prerequisites: MA 244, 251, CS 108. Lab fee: Level 4.

385 Introduction to Probability 3 hrs.
No credit given to students who have successfully completed MA 585. Finite probability spaces, conditional probability, random variables, expectations, variances, covariances, introduction to binomial, Poisson, uniform, exponential, and normal distributions. Prerequisites: MA 151 or 154, and one MA course at the 200 level or above.

415 Introduction to Numerical Methods 3 hrs.
Alternative methods for solution of nonlinear equations, error analysis, acceleration of convergence, interpolation and approximation of functions, numerical integration. Prerequisites: MA 244, 251, CS 108 or equivalent. Lab fee: Level 4.

425 Introduction to Mathematical Modeling 3 hrs.
The purpose of this course is to apply mathematics by formulating, analyzing, and criticizing mathematical models of various phenomena. Examples will be chosen from the physical, biological, and social sciences. The course emphasizes development and use of simple mathematical models by having students study general modeling principles and case studies (some open-ended) drawn from various sources. Prerequisites: MA 244, 352.

440 Algebraic Structures with Applications 3 hrs.
Logic and mathematical proofs, mappings, binary operations, equivalence relations, groups and subgroups, Lagrange's theorem, homomorphisms and isomorphisms, normal subgroups and quotient groups, rings, integral domains, fields, error correcting codes, linear codes, decoding, partially ordered sets, lattices, Boolean algebras, and applications. Prerequisites: MA 244 and at least one MA course at 300 level or above.

452 Introduction to Real Analysis 3 hrs.
Sequences, limits, continuity, differentiation of functions of one real variable, Riemann integration, uniform convergence, sequences and series of functions, power series, and Taylor series. Prerequisite: MA 352 or 440 or approval of instructor.

490 Selected Topics in Undergraduate Mathematics 1-3 hrs.
Courses in requested undergraduate topics. Prerequisite: Approval of instructor.

Graduate Programs
Programs leading to the Master of Arts and Master of Science degrees in mathematics and the Doctor of Philosophy degree in applied mathematics are offered. The programs foster advanced mathematical education through closely integrated instruction and research. The concentration areas offered lead students to examine in greater depth those concepts and techniques introduced at the undergraduate level and further expose them to more sophisticated concepts and techniques. Entering graduate students will have a variety of mathematical backgrounds and goals. Consequently, programs of study leading to the M.A., M.S., or Ph.D. degree can vary considerably. Applied mathematics is emphasized with concentrations available in ordinary and partial differential equations, combinatorics and graph theory, probability and statistic, and numerical analysis. Graduate students who wish to minor in areas such as computer science, physics, atmospheric science, optics or engineering are encouraged to do so.
New graduate students should meet with the graduate program director of the department at their earliest convenience for initial guidance. Later an advisor will be assigned to work closely with each student in designing an individualized program of study to meet the student’s needs according to the School of Graduate Studies requirements.

Admission Requirements

In addition to fulfilling School of Graduate Studies admission requirements, all applicants for graduate study in mathematics or applied mathematics should have completed the equivalent of a complete calculus sequence, a linear algebra course, MA 440, MA 452, and six additional hours in upper-division mathematics courses. Students deficient in more than two undergraduate courses in mathematics must remove these deficiencies before admission to the mathematics program. Such students should consult the graduate program director of the department on how best to remove these deficiencies.

For unconditional admission, applicants must satisfy requirements of the School of Graduate Studies. Only the aptitude portion of the Graduate Record Examination (GRE) is required by the department. The Miller Analogies Test, administered regularly on campus, is accepted by the department in lieu of the GRE for conditional admission.

Master of Arts and Master of Science

The Master of Arts and Master of Science degrees are conferred under Plan I or Plan II. Students should explore with their faculty advisor which plan is better for their particular objectives. For the M.S. degree, a program of study must include a minor area in the College of Engineering or the College of Science. All minors must be outside of the department and must include at least six hours of approved graduate coursework. Master’s programs that include a thesis (Plan I) require at least 24 hours of graduate coursework, and programs without a thesis (Plan II) require at least 33 hours of coursework. At least 50 percent of the coursework hours must be completed in courses numbered 600 or above.

Students should plan a program of study for the Master’s degree with the help of a faculty advisor prior to the completion of 12 semester hours of coursework. Courses taken without an approved program of study may not apply toward a degree. Various areas of mathematics may be stressed in the program of study depending on the student’s needs. The coursework for a non-thesis program of study concentrating in probability and statistics might be MA 444, 570, 585, 593, 656, 685, ST 687, MA 686 or ST 787, and three approved graduate courses, including at least one numbered 600 or above; and the coursework for a non-thesis program of study concentrating in numerical analysis might be MA 515, 526, 544, 570, 614, 615, 626, 715, and three approved graduate courses, including at least two courses numbered 600 or above. Other possible concentration areas include differential equations and discrete mathematics.

Master of Arts with Class A Teaching Certification

Teachers who hold the Alabama Class B Middle/Junior High or High School Certificate may pursue a program of study that leads to a Master of Arts degree with Alabama Class A Certification in mathematics. The coursework for such a program of study might be MA 542, 544, 570, 585, 614, 633, ST 687, nine hours of appropriate graduate education courses, and one approved MA or ST course numbered 600 or above.

Individuals who are interested in obtaining a Master of Arts degree with Alabama Class A certification in mathematics, but who have not completed more than 12 semester hours in teacher education (graduate or undergraduate) courses, should consider the Non-Traditional Fifth Year Program. The MA and ST courses given in the preceding paragraph would be appropriate for such a program. Students should contact the Education Department for preliminary advise-
ment on admission and general program requirements. More details on the Non-Traditional Fifth Year Program are given in the Education Department section.

Doctor of Philosophy

The Ph.D degree program in applied mathematics is designed to enable students to master a significant body of mathematics, including a specialty in applied mathematics; to relate this knowledge to a coherent area of science or engineering other than mathematics; and to carry on fundamental research in applied mathematics. Students who are interested in the program should contact the graduate program director of the department at their earliest convenience.

Each program of study requires at least 54 semester hours of graduate coursework, and must include a major area of concentration consisting of at least six courses in addition to the four common core courses (see below), and a minor consisting of at least four related graduate courses in some area outside of the department. The major, minor, and other courses in the program of study must be selected so that the student will be prepared to conduct research in an area of applied mathematics.

Students must pass three examinations: the joint program examination, the comprehensive qualifying examination, and the final examination. The joint program examination is a written test of the student’s ability to successfully pursue a Ph.D. in applied mathematics. It covers a four course common core in real analysis (MA 653, 754) and linear and numerical linear algebra (MA 544, 614), and a two course sequence in one of several areas including discrete mathematics (MA 540, 640), partial differential equations (MA 526, 626), and probability and stochastic processes (MA 585, 685). The joint program examination can not be taken more than twice.

The comprehensive qualifying examination covers the entire program of study, and is administered by the student’s graduate study supervisory committee. It is part written and part oral. It can not be taken more than twice. Upon successful completion of the comprehensive qualifying examination and the foreign language requirement, the student is admitted to candidacy for the Ph.D. degree.

The final examination is an oral presentation of the dissertation in the form of a seminar before the student’s graduate study supervisory committee. The dissertation is evidence that the student can independently identify a problem of contemporary significance through familiarity with the current literature in some area of applied mathematics, organize and execute a program of research, recognize and analyze the results, and present them in cogent, well-written exposition. It must include mathematical results suitable for publication in a nationally recognized journal.

The foreign language requirement for the Ph.D. degree may be satisfied by completion of 12 semester hours in one of French, German, or Russian with an average grade of B or better, or by acceptable performance on the ETS Graduate School Foreign Language Test for one of these three languages.

The Ph.D. degree program in applied mathematics is a joint program with the other two campuses (Birmingham and Tuscaloosa) of the University of Alabama System. All requirements of the program can be completed at the University of Alabama in Huntsville. However, students are encouraged to spend time at the other two universities, and will be able to enroll in courses at UAH taught by visiting faculty from those institutions.

Graduate Courses (MA)

502 Introduction to Real Analysis 3 hrs.
Sequences, limits, continuity, differentiation of functions of one real variable, Riemann integration, uniform convergence, sequences and series of functions, power series, and Taylor series. Prerequisite: MA 352 or 440 or approval of instructor.
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>515</td>
<td>Introduction to Numerical Analysis</td>
<td>3 hrs.</td>
<td>Numerical solution of ordinary differential equations, solution of linear and nonlinear algebraic systems, iterative methods in matrix algebra, error analysis, and convergence properties of selected methods. Lab fee: Level 4. Prerequisites: MA 244, 352, CS 108 or equivalent. MA 415 recommended before taking this course.</td>
</tr>
<tr>
<td>521</td>
<td>Introduction to Complex Analysis</td>
<td>3 hrs.</td>
<td>Complex algebra, analytic functions, Cauchy-Riemann equations, exponential, trigonometric, and logarithmic functions, integration, Cauchy integral theorem, Morera's theorem, Liouville's theorem, maximum modulus theorem, residue theory, Taylor and Laurent series, and applications. Prerequisite: MA 502 or approval of instructor.</td>
</tr>
<tr>
<td>525</td>
<td>Intermediate Differential Equations</td>
<td>3 hrs.</td>
<td>Systems of linear ordinary differential equations, first order systems with constant coefficients, plane autonomous systems, stability, and selected topics related to properties and characterization of solutions. Prerequisites: MA 244, MA 352.</td>
</tr>
<tr>
<td>526</td>
<td>Partial Differential Equations I</td>
<td>3 hrs.</td>
<td>Systems of first order ordinary differential equations, first order quasilinear partial differential equations, general first order partial differential equation by Cauchy's method of characteristics, higher-order equations, canonical forms, separation of variables, Fourier series, wave equation, heat equation, and potential equation. Prerequisites: MA 244, MA 352.</td>
</tr>
<tr>
<td>530</td>
<td>Introduction to Fourier Analysis</td>
<td>3 hrs.</td>
<td>Fourier series and Fourier transforms with emphasis on the one and two-dimensional transforms. Topics include the basic properties of the Fourier transform, the computation and analysis of the transforms of various functions and generalized functionals, Green's functions, convolution, correlations, sampling, the discrete transform, and applications. Prerequisites: MA 244, 352.</td>
</tr>
<tr>
<td>540</td>
<td>Combinatorial Enumeration</td>
<td>3 hrs.</td>
<td>Counting, pigeonhole principle, permutations and combinations, generating functions, principle of inclusion and exclusion, Polya's theory of counting. Prerequisite: MA 440 or approval of instructor.</td>
</tr>
<tr>
<td>542</td>
<td>Algebra</td>
<td>3 hrs.</td>
<td>Topics from group theory and ring theory: subgroups, normal subgroups, quotient groups, homomorphisms, isomorphism theorems, ideals, principal ideal domains, Euclidean domains, fields, extension fields, elements of Galois theory. Prerequisite: MA 440 or approval of instructor.</td>
</tr>
<tr>
<td>544</td>
<td>Linear Algebra</td>
<td>3 hrs.</td>
<td>Vector spaces, bases, linear transformations, matrices, determinants, eigenvalues, similarity, Jordan canonical forms, dual spaces, bilinear forms, quadratic forms, orthogonal and unitary transformations. Prerequisites: MA 244 and at least one MA course at 300 level or above.</td>
</tr>
<tr>
<td>551</td>
<td>Functions of Several Variables</td>
<td>3 hrs.</td>
<td>Topology of En, limits, continuity, and differentiation of functions of several real variables, Jacobians, implicit function and inverse function theorems, Riemann integration of functions of several real variables, and change of variables theorem for multiple integrals. Prerequisite: MA 502</td>
</tr>
<tr>
<td>570</td>
<td>Metric Spaces with Applications</td>
<td>3 hrs.</td>
<td>Metric spaces, continuous functions, compactness, connectedness, completeness, Arzela-Ascoli theorem, Stone-Weierstrass theorem, Hilbert spaces, contraction mappings, applications to existence and uniqueness of solutions of differential and</td>
</tr>
</tbody>
</table>
Integral equations. Prerequisites: MA 502 and at least one other MA course at the 500 level or above.

585 Probability 3 hrs.
Probability theory and its applications. Independent trails, discrete and continuous random variables, law of large numbers, basic distributions, sums of independent random variables, sequences of random variables, central limit theorem, and convergence in distribution. Prerequisites: MA 251 and one of MA 385, ISE 390, ST 281, or approval of instructor.

590 Selected Topics in Mathematics 3 hrs.
Courses in requested selected topics.

614 Numerical Methods for Linear Algebra 3 hrs.
Norms and vector spaces, matrix factorizations and direct solution methods, stability and conditioning, iterative methods for large linear systems, the algebraic eigenvalue problem. Lab fee: Level 5. Prerequisites: MA 415 or 515, MA 544, CS 108 or equivalent.

615 Numerical Methods for Partial Differential Equations 3 hrs.
Finite difference methods for parabolic, elliptic, and hyperbolic partial differential equations, error analysis, stability, and convergence of finite difference methods. Lab fee: Level 5. Prerequisites: MA 415 or 515, MA 526, CS 108 or equivalent.

620 Asymptotics and Perturbation Methods 3 hrs.
Asymptotic series, regular and singular perturbation theory, asymptotic matching, Laplace's method, stationary phase, steepest descents, WKB theory. Prerequisites: MA 502, 525. MA 521 recommended before taking this course.

621 Special Functions 3 hrs.
Gamma and beta functions, probability integral and applications, orthogonal polynomials, Bessel functions and their applications, spherical harmonics and their applications, hypergeometric functions. Prerequisite: MA 521.

625 Calculus of Variations 3 hrs.
Problems in calculus of variations, necessary and sufficient conditions for extrema of a definite integral in both parametric and nonparametric representations in the plane, Bolza problem. Prerequisite: MA 502 or approval of instructor.

626 Partial Differential Equations II 3 hrs.
Higher dimensional equations, potential theory, eigenfunction expansions for solutions to homogeneous and non-homogeneous equations, Green's functions, and other special topics in the theory and application of partial differential equations. Prerequisite: MA 526.

633 Geometry 3 hrs.
Axioms of incidence and order, affine and metric properties, isometries, similarities, transformation groups, projective planes. Prerequisites: MA 440, 544 or approval of instructor.

640 Graph Theory 3 hrs.
Graphs, subgraphs, trees, connectivity, Euler tours, Hamilton cycles, matchings, edge colorings, independent sets, vertex colorings, planar graphs, Kuratowski's theorem, four color theorem, directed graphs, networks, cycle and bond spaces. Prerequisite: MA 540 or 542.

643 Group Theory 3 hrs.
Isomorphism theorems, permutation groups, basis theorem and fundamental theorem for finite abelian groups, the Remak-Krull-Schmidt theorem, Sylow theorems, normal series, solvable groups, extensions, and selected topics in representation theory. Prerequisite: MA 542.

334
644 Matrix Theory 3 hrs.
Functions of matrices, invariant polynomials, elementary divisors, similarity of matrices, normal forms of a matrix, matrix equations, generalized inverses, non-negative matrices, localization of eigenvalues. Prerequisite: MA 544. MA 521 recommended before taking this course.

645 Combinatorial Design 3 hrs.
Systems of distinct representatives, difference sets, coding theory, block designs, finite geometries, orthogonal latin squares, and Hadamard matrices. Prerequisites: MA 540, 544.

646 Combinatorial Algorithms 3 hrs.
Linear, polynomial and exponential graph theoretic algorithms, generating combinatorial objects, and NP-completeness. Prerequisites: MA 540, 640.

652 Advanced Differential Equations 3 hrs.
Approximate methods, oscillations and periodic solutions, stability and Liapunov theory, delay equations, and selected topics. Prerequisites: MA 502, 525.

653 Real Analysis I 3 hrs.
Countable sets, characterization of open and closed sets, Heine-Borel theorem, Riemann integral, Lebesgue measure and outer measure, measurable functions, Lebesgue integral, Fatou's lemma, and Lebesgue-dominated convergence theorem. Prerequisites: MA 551 and one MA course at the 540 level or above.

656 Complex Analysis I 3 hrs.
Topology of the complex plane, analytic functions of one complex variable, elementary functions and their mapping properties, power series, complex integration, Cauchy's theorem and its consequences, isolated singularities, Laurent series, residue theory. Prerequisite: MA 551 or approval of instructor.

670 Introduction to Functional Analysis 3 hrs.
Normed and inner product spaces, finite dimensional spaces, product and quotient spaces, equivalent norms, Hahn-Banach theorem, principle of uniform boundedness, open-mapping theorem, Riesz representation theorem, complete orthonormal sets, Bessel's inequality, Parseval's identity, and conjugate spaces. Prerequisite: MA 570.

671 General Topology 3 hrs.
Set theory, logic, well-ordering principle, axiom of choice, topological spaces, product spaces, quotient spaces, continuous functions, connectedness, path connectedness, local connectedness, compactness, local compactness, countability and separation, generalized products, Tychonoff theorem. Prerequisite: MA 570.

685 Stochastic Processes with Applications I 3 hrs.
Discrete and continuous Markov chains, Poisson processes, counting and renewal processes, and applications. Prerequisites: MA 585, 244 or approval of instructor.

686 Stochastic Processes with Applications II 3 hrs.
Gaussian and Wiener processes, general Markov processes, special types of processes from queueing and risk theory, and selected advanced topics. Prerequisite: MA 685 or approval of instructor.

690 Special Topics in Mathematics 3 hrs.
Offered upon demand. Advanced selected topics of interest in areas such as discrete mathematics, numerical analysis, differential equations, and stochastic processes.

699 Master's Thesis 3 hrs.
Required each term a student is working and receiving direction on his master's thesis. A minimum of two terms is required. Maximum of nine hours credit awarded upon successful completion of the master's thesis.
Finite element methods for parabolic, elliptic, and hyperbolic partial differential equations; error analysis, stability, and convergence. Lab fee: Level 5. Prerequisites: MA 570, 615.

726 Theory of Partial Differential Equations 3 hrs.
Hilbert space theory of existence, uniqueness, and regularity for partial differential equations. Prerequisites: MA 526, 570.

754 Real Analysis II 3 hrs.
Differentiability of monotone functions, functions of bounded variation, absolute continuity, convex functions, Minkowski and Hölder inequalities, $L_p$ spaces, Riesz-Fischer representation theorem, Fubini’s theorem and selected topics. Prerequisite: MA 653.

756 Complex Analysis II 3 hrs.
Applications of residue theory, harmonic functions and their applications, Mittag-Leffler theorem, infinite products, Weierstrass product theorem, conformal mapping and Riemann mapping theorem, univalent functions, analytic continuation and Riemann surfaces, Picard’s theorems, and selected topics. Prerequisite: MA 656 or approval of instructor.

785 Advanced Probability Theory 3 hrs.
Measure and integration, probability spaces, convergence concepts, law of large numbers, random series, characteristic functions, central limit theorem, random walks, conditioning, Markov properties, conditional expectations, and elements of martingale theory. Prerequisites: MA 585, 653.

790 Graduate Seminar 3 hrs.
Similar to MA 690 but conducted in a seminar format. Work is based largely on original memoirs and journal articles.

799 Doctoral Dissertation 3, 6, or 9 hrs.
Required each term a student is enrolled and receiving direction on his Ph.D. dissertation.

Statistics (ST)

281 Elements of Statistical Analysis I 3hrs.
Descriptive statistics, fundamentals of probability theory, fundamentals of statistical inference, including estimation and hypothesis testing, and use of a typical statistical package such as MINITAB. Prerequisite: MA 154 or 151. Student cannot receive credit for more than one of ST 281, MSC 287, or AHS 300. Lab fee: Level 4.

381 Elements of Statistical Analysis II 3 hrs.
Analysis of variance and multiple comparisons, analysis of covariance, multiple regression and correlations, nonparametric methods, and use of a typical statistical package such as MINITAB. Prerequisite: ST 281 or approval of instructor. Lab fee: Level 4.

687 Theory of Statistics I 3 hrs.
Distribution of statistics based on ordered samples, asymptotic sampling distributions, maximum likelihood, least squares, and other methods of point estimation, Rao-Blackwell theorem and Cramer-Rao inequality, confidence intervals, regions, and their optimal properties. Neyman-Pearson formulation and tests of simple hypothesis against simple alternatives. Prerequisites: MA 244, 585.

690 Special Topics in Statistics 3 hrs.
Courses in requested special topics. Prerequisite: Approval of Instructor.

787 Theory of Statistics II 3 hrs.
Continuation of hypothesis testing, likelihood ratio and unbiased tests, uniformly most powerful tests, power function, nonparametric tests, statistical decision theory, distribution and linear models. Prerequisite: ST 687.
Optical Science Program

Professors: Duthie (chair), Sung; Associate Professors: A. Rosenberger, Torbert; Assistant Professors: Chipman, Hillman.

Optical Science Major

The B.S. degree in optical sciences is one of only three such undergraduate degrees in the United States. The curriculum consists of a major in optical science and background courses in physics, computer science and engineering. Optical Science majors develop a minor in mathematics. The program is designed to produce professionals who are able to move immediately into government or private industry and work in many areas of optics such as optical system analysis, optical image processing, optical sensors, optical communication, laser development and holography. Optical Science graduates are also well-prepared for graduate work in optics, physics and related fields.

Optical science majors receive a strong grounding in geometric and physical optics, then move on to study contemporary topics such as electro-optics, lasers and radiometry. An advanced laboratory exposes students to the use of contemporary equipment and techniques.

The following tables show the curriculum requirements and a typical program of study.

Curriculum for B.S. Degree Optical Science

1. General Education Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EH 101, 102</td>
<td>6 hours of literature (See options in GER section of catalog.)</td>
<td>12 hrs.</td>
</tr>
<tr>
<td>HY 101, 102</td>
<td>Social Science (One discipline)</td>
<td>6 hrs.</td>
</tr>
<tr>
<td></td>
<td>Fine Arts</td>
<td>6 hrs.</td>
</tr>
<tr>
<td></td>
<td>Modern Foreign Language</td>
<td>6-12 hrs.</td>
</tr>
<tr>
<td></td>
<td>or Communication Skills (CS 108 or 113; CM 113; EH 301)</td>
<td>9 hrs.</td>
</tr>
</tbody>
</table>

**TOTAL 36-42 hrs.**

2. Areas of Concentration

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PH 111</td>
<td>General Physics w/Calculus I</td>
<td>4 hrs.</td>
</tr>
<tr>
<td>PH 112</td>
<td>General Physics w/Calculus II</td>
<td>4 hrs.</td>
</tr>
<tr>
<td>PH 113</td>
<td>General Physics w/Calculus II</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>PH 351</td>
<td>Quantum Physics</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>OPT 342</td>
<td>Geometrical Optics I</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>OPT 343</td>
<td>Physical Optics I</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>OPT 411</td>
<td>Geometrical Optics Lab</td>
<td>2 hrs.</td>
</tr>
<tr>
<td>OPT 412</td>
<td>Physical Optics Lab</td>
<td>2 hrs.</td>
</tr>
<tr>
<td>OPT 417</td>
<td>Electro Optics Lab</td>
<td>2 hrs.</td>
</tr>
<tr>
<td>PH 431</td>
<td>Intermediate Electricity &amp; Magnetism</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>PH 432</td>
<td>Intermediate Electricity &amp; Magnetism</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>OPT 441</td>
<td>Intermediate Geometrical Optics</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>OPT 442</td>
<td>Intermediate Physical Optics</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>OPT 444</td>
<td>Electro Optics</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>OPT 445</td>
<td>Introduction to Lasers</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>OPT 446</td>
<td>Radiometry</td>
<td>3 hrs.</td>
</tr>
</tbody>
</table>

**TOTAL 47 hrs.**
3. Math Minor
   MA 153 Calculus I ................................................................. 3 hrs.
   MA 154 Calculus II ............................................................... 3 hrs.
   MA 233 Calculus III ............................................................. 3 hrs.
   MA 244 Introduction to Linear Algebra .................................... 3 hrs.
   MA 251 Calculus IV .............................................................. 3 hrs.
   MA 352 Introduction to Differential Equations .......................... 3 hrs.
   MA 530 Introduction to Fourier Analysis ................................... 3 hrs.
   **TOTAL 21 hrs.**

4. Required Technical Courses
   CS 108 Introduction to Computer Science I ................................ 3 hrs.
   CS 208 Introduction to Computer Science II .............................. 3 hrs.
   EE 300 Electrical Circuits I .................................................. 3 hrs.
   EE 301 Electronic Instrumentation Lab ..................................... 1 hr.
   EE 311 Electronic Instrumentation .......................................... 3 hrs.
   **TOTAL 13 hrs.**

5. Technical Electives
   Technical elective courses in chemistry, physics, mathematics, computer science or engineering
   **TOTAL 5-11 hrs.**

**TOTAL REQUIRED: 128-134 hours**

Typical Schedule for Full-Time Students
(Does not include General Education (GER) courses)

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA 153</td>
<td>MA 154</td>
<td>MA 233</td>
</tr>
<tr>
<td>CS 108</td>
<td>PH 111</td>
<td>PH 112</td>
</tr>
<tr>
<td>Year 1</td>
<td>Year 2</td>
<td>Year 3</td>
</tr>
<tr>
<td>PH 113</td>
<td>Tech. Courses*</td>
<td>Tech. Courses*</td>
</tr>
<tr>
<td>Tech. Courses*</td>
<td>OPT 342</td>
<td>Tech. Courses*</td>
</tr>
<tr>
<td>Year 3</td>
<td>Year 4</td>
<td>Year 4</td>
</tr>
<tr>
<td>PH 451</td>
<td>OPT 411</td>
<td>OPT 412</td>
</tr>
<tr>
<td>Tech. Courses*</td>
<td>OPT 442</td>
<td>Tech. Courses*</td>
</tr>
<tr>
<td>Tech. Courses*</td>
<td>OPT 446</td>
<td>Tech. Courses*</td>
</tr>
</tbody>
</table>

*The following technical courses are required:
   CS 208, EE 300, EE 301, EE 311
   Additional technical courses (electives) totaling at least 5 hours must be taken from mathematics, chemistry, computer science, physics or engineering.
Minor

A minimum of 21 semester hours of course work is required for a minor in optical science. A request for the minor should be initiated by the department in which the student is majoring. The courses should include: OPT 342, 343, 411, 412, 417, 441, 442, plus one of the following: OPT 444, 445, or 446.

Optical Science (OPT)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>342</td>
<td>Geometrical Optics I</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Introduction to the concepts and principles of geometrical optics. Rays and wave fronts, Fermat’s principle, Snell’s law, dispersion, systems of plane mirrors and prisms, paraxial rays, paraxial design, thin lenses and thick lenses, introduction to aberrations and ray tracing. Prerequisite: PH 113.</td>
<td></td>
</tr>
<tr>
<td>343</td>
<td>Physical Optics I</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Electromagnetic waves, simple harmonic motion, superposition of waves, interference of light, Young’s double slit experiment, diffraction gratings, diffraction, speed of light, light sources and their spectra, absorption and scattering, dispersion, polarization. Prerequisite: OPT 342.</td>
<td></td>
</tr>
<tr>
<td>411</td>
<td>Geometrical Optics Laboratory</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Introduction to optical laboratory techniques, focus and alignment with incoherent and coherent sources, the nodal slide, thin lenses, thick lenses, and lens systems, the effects of apertures and stops, reflection, refraction and dispersion, aberrations, elements of radiometry. Prerequisite or parallel: OPT 441. Lab fee: Level 5.</td>
<td></td>
</tr>
<tr>
<td>412</td>
<td>Physical Optics Laboratory</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Introduction to physical optics phenomena, Young’s double slit experiment, Lloyd’s mirror, Fresnel biprism, Newton’s rings, intensity distribution in fringe systems, Michelson interferometer, Fabry-Perot interferometer, Fresnel and Fraunhofer diffraction, diffraction by circular, rectangular and multiple openings, diffraction gratings. Prerequisite or parallel: OPT 442. Lab fee: Level 5.</td>
<td></td>
</tr>
<tr>
<td>417</td>
<td>Electro-Optics Laboratory</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Laser optics, fiber optics, electro-optics and accousto-optics effects, Faraday rotation, frequency doubling, photoelectric detectors. Prerequisite or parallel: OPT 444. Lab fee: Level 5.</td>
<td></td>
</tr>
<tr>
<td>441</td>
<td>Intermediate Geometrical Optics</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Intermediate geometrical optics, first-order optics, linear transformations, paraxial optics, reflection and transmission at an interface, polarized light, Jones and Mueller calculus, matrix methods, ray tracing, apertures and stops, third order optics and aberrations. Prerequisite: OPT 343.</td>
<td></td>
</tr>
<tr>
<td>442</td>
<td>Intermediate Physical Optics</td>
<td>3</td>
</tr>
<tr>
<td>444</td>
<td>Electro-Optics</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Review of polarized light. Zeeman effect, Faraday effect, Kerr electro-optics effect, Kerr cells. Photodetection effect, photodetectors, photoelectronic imaging devices, noise, preamplifiers, detector circuits, the electro-optics of lasers. Prerequisite: OPT 343. (Same as PH 546.)</td>
<td></td>
</tr>
<tr>
<td>445</td>
<td>Introduction to Lasers</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Introduction to the concepts and principles of lasers. Stimulated emission, light amplification, optical pumping, optical resonator theory, cavity modes, gas lasers, solid</td>
<td></td>
</tr>
</tbody>
</table>
state lasers, laser applications, gaussian beams, coherence, holography. Prerequisite: PH 451, PH 432, OPT 442 (Same as PH 545.).

446 Radiometry 3 hrs.

Physics Department

Professors Anderson, Chan, Duthie (Chair), Emslie, Horwitz, F. Rosenberger, Smalley, Sung, Watson; Research Professors Barr, Comfort, Torr; Associate Professors A. Rosenberger, Takahashi Torbert; Associate Research Professor Paciesas; Assistant Professors Cheng, Cheriet, Chipman, Haines, Hillman.

Undergraduate Programs

The undergraduate program provides a broad base in physical principles for a terminal, professional degree in physics while the graduate program provides a smooth transition to a more comprehensive and rigorous treatment of physical principles. The physics curriculum is broad-based through the master's degree, thereupon narrowing into sub-fields and specializations for doctoral studies.

The Department of Physics recognizes three broad areas of emphasis in basic and applied research:

1. Space sciences including studies of magnetospheric physics, atmospheric physics, solar physics, solarterrestrial physics, astrophysics, low-temperature physics, relativity, plasma physics and zero g effects.
2. Solid state/materials including studies of critical phenomena, crystal growth, electromagnetic properties of matter, thermal properties of materials, electron spin resonance, and solid state theory, solid state physics and superconductivity.
3. Optics/quantum electronics including studies of laser physics, propagation, laser media and materials, optical properties of matter, electromagnetic scattering and optical bistability and instability.

Undergraduate Program

The Physics Department offers lectures and laboratory courses necessary for a student to work professionally in physics and/or optics at the B.S. level or to prepare for graduate school.

Physics Major

The basic courses for a B.S. degree with a major in physics include PH 111, 112, 113, 116, 301, 302, 310, 311, 312, 321, 332, 337, 431, 432, 451, 452. Five approved curricula are listed. Other programs may be approved after consultation with student's faculty advisor.

Physics Minor

A minor in physics consists of the basic courses for a B.S. degree in physics as listed above.

Curriculum I

For working professionally at the B.S. level or preparation for graduate school.

<table>
<thead>
<tr>
<th>Curriculum I</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GER (humanities and social sciences)</td>
<td>36-42</td>
</tr>
<tr>
<td>Physics — PH 111, 112, 113, 116, 301, 302, 310, 311, 312, 321, 322, 337, 431, 432, one senior lab at 400 level, 451, 452</td>
<td>40</td>
</tr>
</tbody>
</table>
Curriculum II

For working professionally in optics at the B.S. level.

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GER (humanities and social sciences)</td>
<td>36-42</td>
</tr>
<tr>
<td>Physics</td>
<td>32</td>
</tr>
<tr>
<td>Optical Science</td>
<td>8</td>
</tr>
<tr>
<td>Mathematics</td>
<td>27</td>
</tr>
<tr>
<td>Chemistry</td>
<td>8</td>
</tr>
<tr>
<td>Electives</td>
<td>11-17</td>
</tr>
</tbody>
</table>

NOTE: For entry into a graduate program in physics, students should include PH 302, 321 in their program of study.

Curriculum III

Natural science Program of Study with emphasis on physics. This curriculum will satisfy requirements for the premedical program.

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GER (humanities and social sciences)</td>
<td>36-42</td>
</tr>
<tr>
<td>Physics</td>
<td>32</td>
</tr>
<tr>
<td>Chemistry</td>
<td>21</td>
</tr>
<tr>
<td>Mathematics</td>
<td>18</td>
</tr>
<tr>
<td>Biological Sciences</td>
<td>11</td>
</tr>
<tr>
<td>Electives</td>
<td>4-10</td>
</tr>
</tbody>
</table>

NOTE: Students interested in the premedical aspects of this program are advised to consult with a preprofessional adviser.

Curriculum IV

B.S. degree with a major in physics for students interested in Engineering Physics.

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GER (humanities and social sciences)</td>
<td>36-42</td>
</tr>
<tr>
<td>Physics</td>
<td>36</td>
</tr>
<tr>
<td>Mathematics</td>
<td>18</td>
</tr>
<tr>
<td>Chemistry</td>
<td>8</td>
</tr>
<tr>
<td>Engineering Cognate Studies</td>
<td>30</td>
</tr>
</tbody>
</table>

NOTE: This curriculum will probably require more than the minimum total of 128 semester hours.

341
Curriculum V
B.S. degree with a major in physics. This plan meets requirements for an Alabama Class B High School Teachers Certificate.
GER (humanities and social sciences) ........................................ 36-42
Physics — PH 111, 112, 113, 116, 301, 302, 310, 311, 312, 321, 322, 431, one senior lab at 400 level, 451, 452 ........................................ 37
Mathematics — MA 153, 154, 233, 244, 251, 352, 502, 521 ........................................ 24
Chemistry — CH 121, 123, 125, 126 ........................................ 8
Biological Sciences (minimum of 4 hours) ........................................ 4
Second Teaching Area ........................................................ 27
Professional Education Courses .................................................. 33

NOTES:
1. This curriculum will probably require more than the minimum total of 128 semester hours.
2. Students pursuing this curriculum should consult with the Department of Education early in their program.
3. It is possible for the general education requirements to count toward the second teaching area. Early academic advisement is recommended for students who wish to pursue this option.
4. A general sciences composite major covering the areas of chemistry, biological sciences, environmental science and physical sciences is possible under this curriculum. Interested students should consult the Education Department.

Typical Four Year Program (128 Credits)

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall Cr</th>
<th>Winter Cr</th>
<th>Spring Cr</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CH 121</td>
<td>3</td>
<td>CH 123</td>
<td>3</td>
<td>PH 111</td>
</tr>
<tr>
<td>MA 153</td>
<td>3</td>
<td>MA 154</td>
<td>3</td>
<td>MA 233</td>
</tr>
<tr>
<td>CH 125</td>
<td>1</td>
<td>CH 126</td>
<td>1</td>
<td>GER</td>
</tr>
<tr>
<td>GER+</td>
<td>3</td>
<td>GER</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Sophomore</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MA 244</td>
<td>3</td>
<td>MA 251</td>
<td>3</td>
<td>MA 352</td>
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<td>PH 112</td>
<td>4</td>
<td>PH 113</td>
<td>3</td>
<td>GER</td>
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<tr>
<td>For. Lang</td>
<td>3</td>
<td>PH 116</td>
<td>1</td>
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<tr>
<td>For. Lang</td>
<td>3</td>
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<td>Junior</td>
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<tr>
<td>PH 301</td>
<td>3</td>
<td>PH 302</td>
<td>3</td>
<td>PH 432</td>
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<tr>
<td>PH 310</td>
<td>1</td>
<td>PH 431</td>
<td>3</td>
<td>PH 312</td>
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<tr>
<td>For. Lang</td>
<td>3</td>
<td>PH 311</td>
<td>1</td>
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<td>Senior</td>
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<td>MA 526/530</td>
<td>3</td>
<td>MA 521</td>
<td>3</td>
<td>PH 4XX</td>
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<td>PH 451</td>
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<td>For. Lang</td>
<td>3</td>
<td>PH 452</td>
<td>3</td>
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<tr>
<td>For. Lang</td>
<td>3</td>
<td></td>
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</tbody>
</table>

+General Education Requirement Courses
*PH 337 is offered during the summer term
Astronomy (AST)

106  General Astronomy I  4 hrs.
Introduction to astronomy and astrophysics with emphasis on quantitative aspects of physical phenomena occurring in the universe. The solar system, motion of the earth, seasons, sun, the moon and tides. Telescope systems and their uses, positional astronomy and navigation. Laboratory included. AST 106 and 107 satisfy GER laboratory science requirements. Prerequisite: high school algebra and trigonometry. Lab fee: Level 4. F. (Same as PH 106.)

107  General Astronomy II  4 hrs.

Physics (PH)

Prerequisites for physics courses listed may be waived by instructor or department chairman for auditors or students with equivalent experience.

101  General Physics  4 hrs.
Introductory course for nonscience student. Phenomenological in nature with emphasis on understanding basic ideas of physics and ability to apply these ideas to specific problems. Newtonian mechanics, conservation laws, electrostatics, and currents. Laboratory included. PH 101 and 102 satisfy laboratory science requirement. Prerequisite: high school algebra. Lab fee: Level 4.

102  General Physics  4 hrs.

106  General Astronomy I  4 hrs.
Introduction to astronomy and astrophysics with emphasis on quantitative aspects of physical phenomena occurring in the universe. The solar system, motion of the earth, seasons, the sun, the moon and tides. Telescope systems and their uses, positional astronomy and navigation. Laboratory included. PH 106 and 107 satisfy laboratory science requirements. Prerequisite: high school algebra and trigonometry. Lab fee: Level 4. (Same as AST 106).

107  General Astronomy II  4 hrs.

111  General Physics with Calculus I  4 hrs.
Introductory course for science and engineering students. Phenomenological and quantitative in nature with emphasis on understanding basic ideas of physics and ability to apply these ideas to specific problems. Vectors, Newtonian mechanics, energy, simple harmonic and wave motion. Laboratory included. PH 111 and 112 satisfy laboratory science requirements. Prerequisite: MA 153 and MA 154 in parallel. Lab fee: Level 4.

112  General Physics with Calculus II  4 hrs.
Continuation of PH 111. Heat and thermodynamics, basic electricity, electric and magnetic fields. Laboratory included. Prerequisite: MA 154. Lab fee: Level 4.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>113</td>
<td>General Physics with Calculus III</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>116</td>
<td>General Physics III Laboratory</td>
<td>1 hr.</td>
</tr>
<tr>
<td>211</td>
<td>Selected Topics/Physics</td>
<td>1-4 hrs.</td>
</tr>
<tr>
<td>301</td>
<td>Intermediate Mechanics I</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>302</td>
<td>Intermediate Mechanics II</td>
<td>3 hrs.</td>
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<tr>
<td>310</td>
<td>Intermediate Laboratory I</td>
<td>1 hr.</td>
</tr>
<tr>
<td>311</td>
<td>Intermediate Laboratory II</td>
<td>1 hr.</td>
</tr>
<tr>
<td>312</td>
<td>Intermediate Laboratory III</td>
<td>1 hr.</td>
</tr>
<tr>
<td>321</td>
<td>Thermal and Statistical Physics I</td>
<td>3 hrs.</td>
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<tr>
<td>322</td>
<td>Thermal and Statistical Physics II</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>337</td>
<td>Electronics</td>
<td>4 hrs.</td>
</tr>
<tr>
<td>342</td>
<td>Geometrical Optics I</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>343</td>
<td>Physical Optics I</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>411</td>
<td>Geometrical Optics Laboratory</td>
<td>2 hrs.</td>
</tr>
</tbody>
</table>

Continuation of PH 111 and 112. Modern physics part of general physics sequence. Relativity, quantum effects, atomic and nuclear structure, and elementary particles. PH 116 should be taken concurrently for credit as a laboratory science. Prerequisites: PH 112, MA 233.

Laboratory instruction in support of material covered in PH 113. Prerequisite: PH 113 to be taken concurrently. Lab fee: Level 4.

Vectors and vector calculus, Newtonian mechanics, linear driven and non-linear oscillations, calculus of variations, Lagrangian and Hamiltonian dynamics, central force motion. Prerequisite: MA 352.

Two-particle collisions, special relativity, non-inertial reference frames, rigid bodies, coupled oscillations, vibrating strings, wave equation. Prerequisites: PH 301, MA 352.


Electronics instrumentation, electric fields, motion of charged particles. Prerequisite: PH 310. Lab fee: Level 4.

Electric circuits, acoustics and fluids, optics. Prerequisite: PH 311. Lab fee: Level 4.

States of model system, entropy and temperature, Boltzmann distribution, thermal radiation and Planck distribution, chemical potential and Gibbs distribution, ideal gas, Fermi and Bose gases, heat and work. Prerequisite: PH 113.

Gibbs free energy and chemical reactions, phase transformations, binary mixtures, cryogenics, semiconductor statistics, kinetic theory, propagation. Prerequisite: PH 321.

Introductory course for all science students. Basic AC and DC circuits, vacuum-tube circuits, transistor circuits, power supplies, feedback and their use in laboratory instruments. Laboratory included. Prerequisite: PH 112. Lab fee: Level 4.

Introduction to the concepts and principles of geometrical optics. Rays and wave fronts, Fermat’s principle, Snell’s law, dispersion, systems of plane mirrors and prisms, paraxial rays, paraxial design, thin lenses and thick lenses, introduction to aberrations and ray tracing. Prerequisite: PH 113. F. (Same as OPT 342.)

Introduction to the concepts and principles of physical optics. Wave propagation, Young’s experiment, interference, scalar diffraction theory, Fraunhofer and Fresnel diffraction, coherence, transfer function theory and introduction to Fourier optics. Prerequisite: OPT 342. W. (Same as OPT 343.)

Experiments in optics. Introduction to nodal slide, cardinal points, pupils and stops,
illumination, relay lens set-up, matrix method of lens systems and Delano diagram lens system. Prerequisite: PH 342 or (Parallel: PH 442). Lab fee: Level 5. F.

412 **Physical Optics Laboratory** 2 hrs.
Experiments in Fraunhofer and Fresnel diffraction, interferometry, holography, polarization, spectroscopy coherence and Fourier optics. Lab fee: Level 5. Prerequisite: PH 343 or parallel.

413 **Nuclear Physics Laboratory** 1 hr.
Statistics in counting processes, beta-ray continuum, scintillation spectroscopy. Lab fee: Level 4. F.

414 **Solid State Physics Laboratory** 1 hr.
Fundamental solid state experiments including electron paramagnetic resonance, nuclear magnetic resonance, Hall effect, cyclotron resonance, Mossbauer spectroscopy. Lab fee: Level 4. W.

415 **X-Ray Laboratory** 1 hr.

416 **Senior Laboratory** 1 hr.
Selected experiments from PH 412 - 415. Lab fee: Level 4. Offered upon demand.

420 **Senior Thesis** 3 hrs.
Senior original work performed under direction of faculty member. Lab fee: Level 5. Offered upon demand.

431 **Intermediate Electricity and Magnetism I** 3 hrs.
Basic concepts of electrostatics, electric potential theory, electric fields and currents, field of moving charge including relativistic treatment, magnetic fields, Maxwell’s equation. Prerequisite: MA 251. Prerequisite or parallel: MA 352. W.

432 **Intermediate Electricity and Magnetism II** 3 hrs.
Continuation of PH 431. Development of Maxwell’s equations for time-varying fields, basic concepts of AC circuit theory, electric fields in matter, magnetic fields in matter, modern applications. Prerequisite: PH 431. Sp.

451 **Quantum Physics I** 3 hrs.
This is course one of a two part sequence. Waves and particles; Bohr’s theory of atomic spectra; Energy levels; The old quantum theory; de Broglie waves; Uncertainty principle; Basis postulates of quantum mechanics; Schrodinger’s wave equation; Simple problems in one, two and three dimensions; Hydrogen-like systems; Atomic structure and spectra; Simple perturbation problems; Quantum statistics; The electronic structure of solids; Nuclear physics. Prerequisites: PH 301, MA 244.

452 **Quantum Physics II** 3 hrs.
Continuation of PH 451.

**Graduate Programs**

**Admission Requirements**
Besides meeting the requirements established by the School of Graduate Studies for advanced degrees, the Physics Department requires the advanced portion of the GRE for unconditional admission.

**Master of Science**
There are two MS Plans. Plan I is for a MS degree with a thesis while Plan II does not require a thesis. The final exam for the MS degree, Plan II, is the Physics Department Comprehensive Exam, which is offered once every year, early in the spring quarter. This exam serves both as the preliminary examination for the Ph.D. degree program and the final MS, Plan II.
exam. Details of the exam are available in the department office. Students opting for Plan I do not need to take the comprehensive exam. Students with a Graduate Research Assistantship may be required to file a program of study for the MS Plan I.

Course work during the first one and a half years should be taken with the Comprehensive Exam in mind. A recommended schedule of courses for students entering UAH without previous graduate studies is given in the table below. A total of 24 credit hours in graduate courses plus a thesis is required for students under Plan I and 33 credit hours for the Plan II M.S. degree. All M.S. students are required to take two quarters of PH 792. (Physics Seminar.)

Typical Program for First 1.5 Years Leading to Comprehensive Exam

<table>
<thead>
<tr>
<th>First Year</th>
<th>Winter</th>
<th>Spring</th>
<th>Summer</th>
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<tbody>
<tr>
<td>607</td>
<td>609</td>
<td>631</td>
<td>732</td>
</tr>
<tr>
<td>551</td>
<td>552</td>
<td>601</td>
<td>621</td>
</tr>
<tr>
<td>Second Year</td>
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<td></td>
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<tr>
<td>622</td>
<td></td>
<td>Spec. Top. 1*</td>
<td>Spec. Top. 2*</td>
</tr>
</tbody>
</table>

*In this context the term Special Topic refers to courses taken in preparation for the Special Topic section of the Physics Department’s Comprehensive Exam. For example: students wishing to be examined in Optics should take PH 541 and PH 542, while those wishing to be examined in Solid State Physics should take PH 560 and PH 561. Students should consult with their advisor regarding the selection of Special Topic courses.

NON-TRADITIONAL FIFTH-YEAR PROGRAM leading to the M.S. in Physics plus a Class A Alabama High School Teachers Certificate.

Those who have a BA or BS degree with a major or its equivalent in Physics, as determined by the department of Physics, who have not taken more than 12 semester hours in teacher education (graduate or undergraduate), and who are interested in obtaining Class A (masters level) certification for secondary school teaching, should consider the Non-Traditional Fifth Year Program. Contact the Education Department for preliminary advisement on admission and general program requirements. See the description in the Education section for more details.

Doctor of Philosophy

A statement of procedures for admission to the Ph.D. program in physics may be obtained from the Physics Department office.

Admission to the Ph.D. program in physics is dependent on performance on the Master of Science Comprehensive Examination. Students entering UAH with an M.S. degree or previous graduate training in physics must take the UAH Comprehensive Examination at their earliest opportunity.

A minimum of 48 hours of graduate course credit is required for the Ph.D. in physics. PH 601, 622, 631, 732, 751, 752 and a minimum of 12 credit hours in courses numbered 600 or above must be taken. Students in the Ph.D. program are required to take PH 792 (Physics Seminar) for three terms. Courses in addition to those enumerated above are selected in consultation with the student’s advisory committee. Transfer of credit from other institutions requires approval of the graduate faculty in physics. Although a minor subject is not required, students are encouraged to develop an interdisciplinary program of study.

The Physics Department requires a score of 35th percentile or better in each language on the Graduate School Foreign Language Tests administered by the Educational Testing Service. To show in-depth knowledge of one language, students must score in the 65th percentile or better on the ETS examination.

After having earned 42 hours of graduate credit, students must then pass the departmental qualifying examination. However, the department may require the examination after two or
more years of full-time graduate work or the equivalent in part-time work. This examination may be taken no more than twice. It tests students' general fitness for pursuing a research project in their chosen area and their general knowledge of physics.

Finally, a significant portion of the dissertation must be submitted for publication in an approved journal with international circulation.

Graduate Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>506</td>
<td>Introduction to Astrophysics of Stellar Systems</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Analysis of structure of main sequence stars; radiation theory, color-magnitude diagrams and their interpretation. Dynamics of simple and many-body systems—the restricted 3-body problem, Hamilton-Jacobi methods, Liouville's and Jean's theorems and their application to galactic structure. General relativity and application to cosmology. Prerequisites: PH 302, 321, 432, MA 352.</td>
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</tr>
<tr>
<td>531</td>
<td>Introduction to Plasma Dynamics</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Plasma kinetic theory including charged-particle and neutral collisions, ionization, electronic excitation and recombination, motion of charged particles, macroscopic equations. Transport coefficients, gas discharges, instabilities, sheaths, electromagnetic waves and radiation. Prerequisites: PH 322, 432. F.</td>
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<tr>
<td>541</td>
<td>Optics I</td>
<td>3 hrs.</td>
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<td></td>
<td>Geometrical optics review. Physical optics: interference, diffraction, partial coherence, polarization, interaction of radiation with matter. Prerequisite: PH 432 or equivalent. (Same as EE 541.) F.</td>
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<tr>
<td>542</td>
<td>Optics II</td>
<td>3 hrs.</td>
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<td>Integral formulation of radiation from apertures and scattering objects; Fourier and Laplace transform theory; impulse response, imaging and transforming; coherence, optical filtering, holography; interference. Prerequisites: PH 541. (Same as EE 542.) W.</td>
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<tr>
<td>544</td>
<td>Radiometry</td>
<td>3 hrs.</td>
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<td></td>
<td>The theory and practice of radiometry. Nomenclature, Planck's law, blackbodies and blackbody simulators, the propagation of radiant energy, detectors, normalization, source detector spectral mismatch, attenuation, very low signals and the avoidance of common errors. Prerequisite: PH 342. (Same as OPT 446.)</td>
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<tr>
<td>545</td>
<td>Introduction to Lasers</td>
<td>3 hrs.</td>
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<td></td>
<td>Basic physical concepts of spontaneous and simulated radiation. Pumping processes, optical resonators, types of lasers and laser beam properties. Prerequisites: PH 343, 442, 451. (Same as OPT 445.)</td>
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<tr>
<td>546</td>
<td>Electro Optics</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Planck’s law, blackbodies and blackbody simulators, propagation of radiant energy, detectors, noise, basic circuits for photoelectric detectors. Prerequisite: PH 342. (Same as OPT 444.)</td>
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</tr>
<tr>
<td>551</td>
<td>Introductory Quantum Mechanics I</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>This is course one of a two course sequence. Wave-particle duality and uncertainty principle; The Schrodinger's wave equation; Simple systems in one, two and three dimensions; Matrix formulation of quantum mechanics; Angular momentum and spin; Addition of angular momentum; Time independent perturbation theory; Variational method and WKB approximation; Time dependent perturbation theory; Scattering theory; The interaction of electromagnetic radiation with atomic systems; Quantum statistics; The band theory of electrons in crystals. Prerequisites: PH 302, 432, 452. (Same as CH 553.) F.</td>
<td></td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
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<tr>
<td>552</td>
<td>Introductory Quantum Mechanics II</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Continuation of PH 551. Prerequisite: PH 551. (Same as CH 554.) W.</td>
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<tr>
<td>560</td>
<td>Introduction to Solid State Physics I</td>
<td>3 hrs.</td>
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<td></td>
<td>Crystal binding and crystal structure. Crystal structure determination. Phonons and lattice vibrations. Free electron gas. Electronic energy band theory. Prerequisite: PH 551 or equivalent. F.</td>
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<tr>
<td>561</td>
<td>Introduction to Solid State Physics II</td>
<td>3 hrs.</td>
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<td></td>
<td>Thermal properties of solids. Electronic properties, optical properties, electronic properties in a magnetic field, semiconductor devices, magnetism, superconductivity, defects and alloys, dislocations and crystal growth, non-crystalline solids, surfaces and interfaces. Prerequisite PH 560. W.</td>
<td></td>
</tr>
<tr>
<td>601</td>
<td>Classical Dynamics I</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Variational principles and Lagrangian mechanics, rigid body motion, Hamilton’s equations, and theory of small oscillations. Aspects related to modern physics. Prerequisite: PH 302 and, prerequisite or parallel, MA 521. Spring.</td>
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</tr>
<tr>
<td>607</td>
<td>Mathematical Methods I</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>609</td>
<td>Mathematical Methods II</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Continuation of PH 607. Prerequisite: 607. Winter.</td>
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<tr>
<td>621</td>
<td>Statistical Mechanics and Kinetic Theory I</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Statistical methods, systems of particles, statistical thermodynamics, applications of thermodynamics, methods of statistical mechanics, applications of statistical mechanics, equilibrium between phases of chemical species. Prerequisites: PH 552, MA 521. Summer.</td>
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<tr>
<td>622</td>
<td>Statistical Mechanics and Kinetic Theory II</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Quantum statistics of ideal gases, systems of interacting particles, magnetism and low temperatures, elementary transport theory, advanced transport theory, irreversible processes and fluctuations. Prerequisite: PH 621. Fall.</td>
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<tr>
<td>631</td>
<td>Electromagnetic Theory I</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Electrostatic and magnetostatic fields in vacuum and material matter, conservation laws, homogeneous wave equations. Prerequisites: PH 432, 607, MA 521. Spring.</td>
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<tr>
<td>636</td>
<td>Introduction to Space Plasma Physics</td>
<td>3 hrs.</td>
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<td></td>
<td>Charged particles in electric and magnetic fields, cosmic rays and trapped radiation, introduction to plasmas, including collisions and macroscopic effects. Prerequisites: PH 531, 631.</td>
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<tr>
<td>639</td>
<td>Experimental Plasma Physics and Instrumentation</td>
<td>3 hrs.</td>
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<td>Techniques and instruments for plasma diagnostics, probe theory, optical, spectroscopic, radio and radar measurements, discrete particle analyzers, interactions of spacecraft and instruments with the plasma environment. Prerequisites: PH 531, 631.</td>
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<tr>
<td>645</td>
<td>Infrared Science</td>
<td>3 hrs.</td>
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<td></td>
<td>Theory and practice of infrared science, foundations of infrared principles followed by study of infrared sources, atmospheric transmission, infrared detectors and system concepts. Prerequisite: PH 541.</td>
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</tr>
<tr>
<td>672</td>
<td>Optical Surface Characterization</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Types of optical surfaces, surface and scattering measurements and measurement equipment, scattering theories, micro-irregularities, optical surface characterization, surface absorption and thick films. Prerequisite: PH 542.</td>
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</tr>
</tbody>
</table>

348
673 Fourier Optics 3 hrs.
Diffraction theory, Fourier transforms, Fraunhofer and Fresnel diffraction, Fourier transform properties of lenses, angular spectrum coherence theory, spatial filtering, optical information processing, holography. Prerequisite: PH 542.

684 Aeronomy I — Photochemistry 3 hrs.
Neutral atmospheric composition and thermal structure, solar flux and absorption processes, photochemistry of the mesosphere, thermosphere, ionosphere, aurora and airglow. Prerequisites: PH 551, 622.

687 Aeronomy 2 — Dynamics and Energetics 3 hrs.
Transport processes in the mesosphere, thermosphere and ionosphere—ambipolar diffusion, neutral dynamics and electric field effects, high latitude ionosphere and polar wind, thermospheric energetics, thermal balance—sources and sinks of heat, heating efficiencies, energy balance equations, global thermospheric energy budget, modeling of the neutral atmosphere. Prerequisite: PH 684.

689 Selected Topics 3 hrs.
Offered upon demand. Previous topics: superconductivity, optical properties of solids in infrared, laser propagation, collision theory, quantum electronics, and microwave properties of solids.

699 Master's Thesis 3 hrs.
Minimum of two terms required for M.S. students. Maximum of nine hours credit awarded upon successful completion of master's thesis.

702 Classical Dynamics II 3 hrs.
Continuation of PH 601. Review Lagrangian and Hamiltonian dynamics, canonical transformation, Hamilton-Jacobi theory, Lagrangian field theory, selected topics. Prerequisite: PH 601.

705 Relativity 3 hrs.
Special and general theory. A covariant formulation of electro-dynamics. Prerequisites: PH 601, 631.

706 Solar Flare Physics 3 hrs.
Overview of the flare phenomenon; magnetic field structure and stability. Radiation mechanisms; energy transport by particles, hydrodynamic motions and radiation, empirical and theoretical atmosphere models; energy release mechanisms; solar terrestrial effects. Prerequisites: PH 531, 631.

711 Problems in Physics I 3 hrs.
Application of theoretical principles of physics to an intensive analysis and solution of representative problems. Prerequisites: PH 552, 601, 622, 631.

712 Problems in Physics II 3 hrs.
Continuation of PH 711. Prerequisite: PH 711.

731 Advanced Plasma Theory 3 hrs.
Kinetic theory of plasmas. Vlasov equation of plasma waves, Landau damping and kinetic theory of stability, quasi-linear and non-linear theory, transport theory in plasmas, applications to space plasmas, plasma astrophysics and fusion research. Prerequisites: PH 531, 732.

732 Electromagnetic Theory II 3 hrs.
Continuation of PH 631. Inhomogeneous wave equation and sources. Special relativity, radiation from accelerated charges, and Hamiltonian formulation of electrodynamics. Prerequisite: PH 631. Summer.

745 Quantum Electronics 3 hrs.
The propagation of optical beams in homogeneous and lenslike media, optical resonators, interaction between radiation and atomic systems, laser oscillations and
specific laser systems, q-switching and mode locking of lasers, noise in laser amplifiers and oscillators, modulation of optical radiation. Prerequisites: PH 545, 552, 631.

746 Non-Linear Optics 3 hrs.
Non-linear optical susceptibilities, wave propagation in nonlinear media, second harmonic generation, parametric amplification and fluorescence, stimulated Raman and Brillouin scattering, two photon absorption, optical bistability, phase conjugation, four wave mixing. Prerequisites: PH 542, 551, 631.

751 Quantum Mechanics I 3 hrs.
This is course one of a three course sequence. General formulation of the quantum theory, angular momentum and spin, steady state perturbation, time dependent perturbation theory, identical particles, symmetry principles, tensor operators, interaction of radiation with matter, formal scattering theory, relativistic wave equations, second quantization, interaction fields, quantum electrodynamics, Feynman techniques. Prerequisites: PH 552, 601, 609.

752 Quantum Mechanics II 3 hrs.
Continuation of PH 751. Prerequisite: PH751.

753 Quantum Mechanics III 3 hrs.
Continuation of PH 751 and 752. Relativistic wave equations, second quantization, interacting fields, Feynman techniques. Prerequisite: PH 752.

760 Quantum Theory of Solids I 3 hrs.
Semiclassical introduction, second quantization and the electron gas, Boson systems, one-electron theory and metals, electron-phonon interactions, superconductivity, dynamic electrons in a magnetic field, semiconductor crystals, energy bands, impurity states, semiconductor crystals II, optical absorption and excitations. Prerequisites: PH 552, 561, 631.

761 Quantum Theory of Solids II 3 hrs.
Continuation of PH 760. Selected topics from quantum theory of solid state physics including many-body technique, transport properties, optical properties, superconductivity. Prerequisites: PH 752, 760.

773 Fourier Optics II 3 hrs.
Review of diffraction theory and Fourier transforms, fast Fourier transforms, analytic signals, wavefront aberrations and the aberration polynomial, diffraction patterns and diffraction images, sampling theorem and band limited signals. Prerequisite: PH 673.

780-789 Selected Topics 3 hrs.
Offered upon demand. Previous topics: superconductivity, optical properties of solids in infrared, laser propagation, collision theory, quantum electronics, microwaves, properties of solids, gravitational theories.

792 Physics Seminar No credit
Speakers are invited to report on individual research or on journal articles. Two terms are required for all MS students and three terms for Ph.D. students.

795 Advanced Physics Project Laboratory 3 or 6 hrs.
Advanced laboratory research in one of the departmental research groups. Student works on an independent or group project. Completion of the course requires a written report that becomes part of the student’s record. Prerequisite: Approval of advisor. Approval of Department Chairman is required for more than 3 credit hours.

799 Doctoral Dissertation 3, 6, 9 hrs.
Prerequisites: Students must have passed the Comprehensive Exam at Ph.D. level and have Ph.D. advisor’s approval.
School of Graduate Studies

Dean: Samuel P. McManus, Professor of Chemistry.

The graduate programs of The University of Alabama in Huntsville foster a creative learning experience while further strengthening intellectual capabilities through intensive studies. Graduate studies are characterized by a greater degree of independence in the student and concurrently by a closer association with one or more members of the graduate faculty. Only those students showing distinct promise of completing the requirements for a graduate degree are admitted to the School of Graduate Studies.

The graduate degree is based on a Program of Study designed to reach a specific intellectual or professional goal. This program of study should be planned by the student at the earliest appropriate time (see specific degree programs) with the counsel of a faculty advisor. The program includes advanced studies in subject-matter areas and, in most cases, a research phase in which the student demonstrates independent scholarly work. It is the student's responsibility to be acquainted with all requirements related to a desired program and to fulfill these requirements.

History

Graduate courses have been offered in Huntsville since the earliest days of higher education in the area. With Redstone Arsenal, NASA's George C. Marshall Space Flight Center, and other scientific and technical organizations concentrated in Huntsville, a demand was felt as long ago as 1950 for postgraduate coursework emphasizing theoretical and practical studies. Graduate courses were first given in Huntsville in 1951 under the direction of the Graduate School of the University of Alabama in what was then called the Redstone Institute of Graduate Study. The graduate program was then completely separate from the new undergraduate program, except that both held classes at what was then Butler High School. In addition, separately funded graduate courses in education were being held elsewhere in Huntsville, independent of both. After a two-year lapse because of the cancellation of government sponsorship, the graduate program re-opened in January of 1956 with classes in physics, engineering, mathematics, and management. Even more than the undergraduate program, graduate studies grew with the space program. At the encouragement of Redstone Arsenal, the Research Institute was created in 1960. Three years later it was announced that Masters degrees could be awarded locally in mathematics, physics, chemistry, and engineering. The first Masters degree, in mathematics, was awarded in 1964, and the following year two Masters degrees were awarded for work begun and completed at Huntsville. In 1971 doctoral programs in engineering and physics were initiated. The School of Graduate Studies was organized in its present form in 1976.

GRADUATE DEGREE PROGRAMS

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Graduate Degree Requirements

The following scholastic requirements are those of the School of Graduate Studies (individual departments may list additional requirements):

1. Overall grade average must be B or better on all graduate credit hours at UAH. In addition, the grade average must be B or better on courses taken in the current graduate degree program.

2. No grade lower than a C may be counted toward a graduate degree.

3. At least 50 percent of the hours required for a graduate degree must be completed in courses numbered 600 or above.

4. At least 50 percent of the courses on a student’s Program of Study must be taught by UAH full-time faculty members.

Probationary Status

1. Students admitted conditionally who attain an overall grade average of B or better for all graduate work attempted up to and including the term in which 12 semester hours are completed assume the status of an unconditionally admitted student.

Any time a student’s overall grade average on graduate courses drops below a B, the student will be placed on probation.

2. A student on probation is not a candidate for a degree.

3. Probationary status is removed by raising the overall grade average to B or better on all graduate work attempted in all terms up to and including the term in which 12 semester hours of graduate work are completed following the term the student is placed on probation.

4. Failure to remove probation in the manner described results in dismissal from the School of Graduate Studies. In exceptional cases students may be re-admitted upon recommendation of the faculty in the major department and approval by the graduate dean.

The Master’s Degree

Students may follow one of two plans for the Master’s degree, except where modified by individual departments. To avoid delay, students are encouraged to plan a Program of Study with the help of a faculty advisor before the completion of 12 semester hours of coursework. Courses taken without an approved program of study may not apply toward a degree.
Plan I (Thesis)

Degree requirements under this plan include completion of 24 or more semester hours of graduate course credit hours and 6 or more of thesis credit hours, and the writing of an acceptable thesis.

The thesis should show evidence of the student's capability for research, independent thought, and analysis. Furthermore, the thesis should be written in fluent, acceptable English. The subject must be in the major field and approved by a faculty committee of the major field, by the chairman of the department, and by the graduate dean. All theses must be accessible to the general public.

A completed copy of the thesis must be submitted to the major department at least four weeks before the date on which the candidate expects to receive the degree. At least three weeks before graduation, four copies of the thesis approved by the thesis committee and the graduate dean must be deposited in the Office of the Associate Registrar along with a receipt for the binding fee. Theses must comply with the regulations set forth in the Graduate School's Thesis Manual available in the University Bookstore.

In exceptional cases, theses may be written in absentia. Before leaving the University, students must 1) select a thesis subject, 2) submit to the chairman of the major department a satisfactory outline of the thesis, and 3) submit satisfactory evidence that adequate facilities are available where work is to be done. Such a plan must then be approved by the student's advisor, the department chairman and the graduate dean.

Plan II (Non-Thesis)

Degree requirements for the Master's degree under this plan include the completion of a minimum of 33 semester hours of graduate coursework. A thesis is not required.

A candidate working under Plan II may be required to participate successfully in a seminar or in problem courses for acquaintance with research methods and appreciation of the place and function of original investigation in the field.

Transfer Credit

With permission of the major department, students may transfer a maximum of six semester hours of acceptable graduate credit earned in an approved institution and may count it toward a Master's degree. Students may also petition the major department to recommend to the graduate dean that six additional hours of graduate credit be accepted. All transferred credit may not be more than six years old at the time of a student's graduation from UAH. It is transferable only if the student was enrolled in a graduate school at the time it was taken and has an overall average in graduate coursework at the institution of B or better. Students who have graduate credits from another campus of the University of Alabama must complete a minimum of 12 semester hours of acceptable graduate credit at UAH to receive a Master's degree from UAH.

Candidacy for the Master's Degree

A student admitted to a Master's degree program is a candidate for the Master's degree only if the student has met all admission requirements, is not on probation, has an approved Program of Study on file in the Office of Admissions and Records, and has an average of B or better on all graduate work attempted at UAH.

Final Examination

A final comprehensive examination is required of all candidates for a Master's degree; this examination may be written, oral, or both. The candidate will be examined on the coursework and thesis in Plan I and on the coursework in Plan II. The examination is conducted by a committee of at least three members appointed by the department and approved by the graduate
dean. The examination committee is usually (but not always) the same as the thesis supervisory committee. The members of the examining committee are selected by the advisor in consultation with the student. Moreover, the examining committee is composed of faculty members whose areas of expertise cover the areas listed on the student’s program of study if possible. The majority of the committee must be composed of full-time UAH faculty members. A written notice of the time and place of examination is sent to the graduate dean and the associate registrar, the department sends a copy of the written notice to the candidate and each member of the committee. The examination must be given at least one month before the date of graduation and the results reported promptly to the graduate dean. A student may take the final oral or written examination only twice.

Application for Degree

Each candidate for an advanced degree must apply for the degree through the Office of Student Records at least three months before the degree is to be conferred.

Time Limit

All requirements for the master’s degree must be completed in not more than six years. Credit for individual graduate courses completed at UAH more than six years but less than ten before the completion of all requirements for the degree may be validated by special examination. Such an examination, given by the department in which the course is offered, can be taken only once and will be the equivalent of a final examination in the course. When the student passes the examination, the course is considered valid through the tenth year only.

Credit for courses transferred from other institutions cannot be validated at UAH.

Second Master’s Degree

A student is permitted to apply no more than six semester hours of credit earned for one graduate degree toward an additional master’s degree at UAH. Such permission is granted at the discretion of the major department.

Summary of Checkpoints Toward Completion of Degree Requirements

The following checkpoints have been established to assist a student in proceeding from admission to graduation. Timely completion of the forms, in sequence, will help to insure that a student’s degree program is in order.

Form 3: Program of Study. This form must be filed as early as possible and definitely before the completion of 12 semester hours. If the program is developed by a supervisory committee, the student may be invited to the committee meeting.

Form 3 A: Petition for a change in Form 3, if any. A valid reason must be given for the change.

Form 5: Application for Advanced Degree. This is to be filed at least three months before graduation. It is available at the Office of Student Records.

Form 6: Notification of Final/Qualifying Examination. Notification of the examination date must be given at least two weeks in advance. The final examination must be taken at least one month before graduation, and not earlier than the term in which the student completed all required coursework.
The Doctor of Philosophy Degree

The Doctor of Philosophy degree is a research-oriented degree awarded upon the demonstration of scholarly competence. The degree program at UAH is based on the successful completion of a program of study designed by the student and a faculty committee. The program includes mastery of certain research skills (languages, computer programming, statistics, and others approved by the Graduate Council) and an independent research project, the results of which are presented in the form of a dissertation.

Degree Requirements
The following specific degree requirements are applicable to all Ph.D. degree programs within the University. Additional requirements may be specified by individual departments as shown in this catalog under the appropriate department.

Course Requirements
The School of Graduate Studies imposes no specific course or credit-hour requirements for the Ph.D. Course requirements are defined in the Program of Study and are determined by the appropriate department. Usually the student will take a majority of the courses in a given field with the remainder in a cognate field. This, however, is not a requirement. A maximum of nine semester hours credit in thesis/research work from the master's degree may be allowed to count toward the Ph.D. requirements.

Students must also register for a minimum total of 18 semester hours of dissertation research. The approval of the Program of Study should be accomplished as early as possible, but no later than the end of the first year of study. Once approved, the program may only be amended by the supervisory committee.

Transfer Credit
All credit toward the Ph.D. which has not been earned at UAH must be acceptable graduate credit, transferred from an approved institution. Such credit is transferred only with approval of the major department, and if the student was enrolled in a graduate school at the time it was taken and has an overall average in graduate coursework at the institution of B or better.

Foreign Language Requirement
Some departments may have language requirements. Students should refer to a department's listing for specifics. All foreign language requirements listed on a student's Program of Study must be approved by the graduate dean. The Graduate Council and the Dean of Graduate Studies must approve any change a department wishes to make in its policy.

Residence Requirement
For the award of a Ph.D., residence at UAH as a graduate student is required for evaluation of the student's investigative abilities, independent thought, and scholastic progress by faculty members other than the major advisor.

Full-time residence at UAH for at least one continuous academic year or its equivalent during the student's graduate career is judged to be minimum. All research effort presented for residence credit toward the Ph.D. degree must be performed under the direction of a full-time member of the graduate faculty.

Supervisory Committee
A supervisory committee is appointed for each student working toward the Ph.D., usually after satisfactory completion of a preliminary examination administered by the major depart-
The supervisory committee is composed of at least five members with a minimum of three from the department of the major and one or more from the department(s) of the minor(s). The supervisory committee is appointed by the department with approval of the graduate dean and will examine the student's research proposal for the dissertation.

Qualifying Examination
The qualifying examination is given under the auspices of the supervisory committee after the student has completed the Program of Study and the language requirement.

The examination is a demonstration of proficiency in the subject matter phase of the Program of Study and shall be part written and part oral. The written portion shall become a part of the student's permanent record. The examination may be taken twice if necessary. Further attempts will require the permission of the Graduate Council.

Admission to Candidacy
Upon successful completion of the qualifying examination and the foreign language requirement, the student may be admitted to candidacy for the degree.

Admission to candidacy is based on the recommendation of the student's supervisory committee and the appropriate department and is approved by the graduate dean. It is the responsibility of the student to secure the appropriate forms from the Associate Registrar's Office and to initiate the procedure for admission to candidacy at least six months preceding the awarding of the degree. Candidacy is not transferable from another institution.

Dissertation
The dissertation is evidence that the student can independently identify a problem of contemporary significance through familiarity with the current literature in the major field, organize and execute a program of research, recognize and analyze the results, and present them in cogent, well-written exposition. Dissertation results are expected to be submitted for refereed scholarly publication. All dissertations must be accessible to the general public.

A completed copy of the dissertation must be submitted to the major department at least one month before graduation. At least two weeks before graduation, four copies of the dissertation, approved by the student's committee and the chairman of the major department and the graduate dean, are to be deposited in the Associate Registrar's Office with a receipt for the binding fee. A copy of the dissertation must be submitted for microfilming to University Microfilms International by the time of graduation. Dissertations must comply with the regulations set forth in the Graduate School's Thesis Manual available in the University Bookstore.

Application for Degree
Each candidate for a Ph.D. degree must apply for the degree through the Office of Student Records as least three months before the degree is to be conferred.

Final Examination
The final examination is an oral presentation of the dissertation in the form of a seminar before the student's committee and is open to the members of the University community.

Time Limit
All requirements for the doctoral degree must be completed in no more than five years after the student has passed the qualifying examination.
Summary of Checkpoints Toward Completion of Degree Requirements

The following checkpoints have been established to assist a student in proceeding from admission to graduation. Timely completion of the forms, in sequence, will help to insure that a student's degree program is in order.

Form 4: Graduate Student Supervisory Committee. This committee (see above) supervises the student's work throughout the doctoral program. It is selected by the student and the major advisor after the student has satisfactorily passed the preliminary examination.

Form 10: Program of Study for the Doctoral Degree. Subsequent to approval of Form 4, the committee should meet to develop a complete program for the student, who should be invited to the meeting.

Form 3 A: Petition for a change in Form 10, if any.

Form 6: A Notification of Qualifying Examination. Students should consult with their advisors about specifics.

Form 11: Application for Admission to Candidacy for the Degree of Doctor of Philosophy. This form must be completed after passing the qualifying examination and the language requirement at least six months before graduation. (Available from the Office of Student Records.)

Form 5: Application for Advanced Degree. This should be filed three months before graduation. (Available from the Office of Student Records.)

Form 6: Notification of Final Examination. Notification of the final examination requires a minimum lead time of two weeks. This examination must be taken at least one month before graduation.

Cooperative Programs
Between UAH and the University of Alabama, Tuscaloosa (UA)

Close cooperation on Ph.D. programs exists between departments on the UAH campus and departments on the Tuscaloosa campus authorized for carrying on doctoral work. Applicants to programs in mathematics, chemistry, and administrative science who desire to make maximum use of services in Huntsville may submit application materials to the UAH School of Graduate Studies. Upon being admitted, the student will be advised of the procedures for program planning.

The minimum residence requirements on the Tuscaloosa campus include two consecutive semesters (or, if specifically approved by the faculty concerned, one full summer of two terms preceded by or followed by one regular semester) and 18 semester hours of credits (including research, seminars, dissertations, special problems, or other assignments for which a credit equivalency may be established).

Between Auburn University and the University of Alabama System

In some designated programs, a student enrolled in either Auburn University or any campus of the University of Alabama System may register as a transient student at the other institution
with the approval of both graduate deans, or their representatives, and the department or school in which the student wishes to take the work. The amount of coursework that may be taken by a student under such an arrangement will be determined by the supervisory committee, with appropriate approvals at the other university.

A student earning a Master's degree at either institution must complete at least one-half of the required coursework at the institution granting the degree.

For a course to be applicable for credit above the six hours presently transferable toward a Master's degree or beyond the Master's, the course must be approved in advance by the student's major department or school and the graduate dean.

The deans of the graduate schools will serve as liaison officers in arranging programs for which the additional hours may be transferred.

**Between UAH and Alabama A&M University**

A visiting student policy has been established between Alabama A&M University and UAH. Under this arrangement, a graduate student at one institution may request permission to attend a course at the other. Conditions governing the granting of permission include the following:

1. The student must be in good graduate standing
2. The course desired is unavailable to the student at the home institution
3. A visiting student is limited to one graduate course a term at the host institution except where the second course is a laboratory required to accompany the first course
4. A visiting student must have prerequisites for the course
5. The number of courses taken under this plan cannot exceed those allowed in the policy on transferred credit
6. The student's request requires the approval of the advisor, department chairman, and graduate dean
7. Permission of the host institution is dependent upon availability of space for the visitor after its own students are accommodated.

Interested students should contact the Office of Admissions and Records for appropriate forms.

**Between UAH and The University of Alabama at Birmingham (UAB)**

A cooperative program in Engineering was initiated between UAH and UAB for the pursuit of doctoral degrees. A student at UAB may earn the doctoral degree at UAH with a major in electrical engineering, computer engineering, or mechanical engineering; while a UAH student may pursue the master or the doctoral degree with a major in biomedical engineering at UAB. An interested student must first be admitted at the principal institution i.e. the one offering the degree, but may take courses and satisfy the residency requirements at either campus. All degree requirements must be satisfied at the principal institution. More details are available through the participating departments.

**Interdisciplinary Programs**

The University of Alabama in Huntsville has formalized areas of study which cross the traditional departments. These interdisciplinary areas of study encompass science and engineering, and the centers where organized research exists. The formalized programs are optics, atmospheric science, materials science and computational fluid dynamics. Other areas under development include robotics, and space plasma. Inquiries about these interdisciplinary programs should be addressed to the Dean of the School of Graduate Studies.
Atmospheric Science

Research and instruction in the area of Atmospheric Science has been within the expertise of UAH for many years. This effort supports NASA’s Marshall Space Flight Center programs in the use of space-borne sensors to observe the earth’s atmosphere. Students, faculty, and research staff have successfully developed specializations in atmospheric remote sensing, wave propagation, cloud modeling, dynamic meteorology, geophysical fluid dynamics, storm physics, climatology, and mesoscale modeling. Research is on-going in cooperation with Marshall Space Flight Center, the Army Missile Command, the National Science Foundation, and the Tennessee Valley Authority.

Students interested in atmospheric science may pursue a Master of Science or the Doctor of Philosophy degree in graduate programs in the Departments of:

- Industrial and Systems Engineering
- Mechanical Engineering
- Mathematical Sciences
- Physics

Students choose atmospheric specializations and research projects in specific areas of atmospheric science and engineering. In addition, students must meet departmental degree requirements.

Optics

Research and specialization in optics at UAH date back to the early 1960’s. The Center for Applied Optics was formally established in 1985. The Center has already been selected by the Strategic Defense Initiative Organization to be the lead center in the consortium to study innovative techniques for high speed optical computing. The Center houses many laboratories and also directly employs scientists and engineers to supplement teaching in the academic departments.

Interested faculty and students are encouraged to carry on research in various areas and are partially funded through the Center for Applied Optics. Students must first affiliate with one of the departments listed below to pursue a program leading to a Master of Science or Doctor of Philosophy degree.

Chemistry

- Computer Science
- Electrical and Computer Engineering
- Industrial and Systems Engineering
- Materials Science
- Mathematical Sciences
- Mechanical Engineering
- Physics

Students choose specializations and research projects in specific areas of optics. In addition, students must satisfy departmental degree requirements. A doctoral degree program in optics is being planned.

Computational Fluid Dynamics

Research and instruction in the area of Computational Fluid Dynamics (CFD) have been underway at UAH for many years. Pioneering work in the Finite Element Method established its roots at UAH in the early 1960’s. Current activities blend finite difference and finite element methods with research in numerical grid generation, algorithm development and advanced computing to create an active computational environment. Much of this active research is in
support of NASA’s Marshall Space Flight Center and the Army Missile Command, both located at the Redstone Arsenal in Huntsville. The scope of this work ranges from the analysis of external flows over guided missiles to the internal flows of the Space Shuttle main engines. The design and analysis of propulsion systems has been a focus of both UAH and the Huntsville technical community for many years and much of the ongoing research is in support of rocket engines. Research potential exists in virtually all phases of fluid dynamics ranging from incompressible subsonic to compressible hypersonic flows.

As Computational Fluid Dynamics continues to mature as a discipline, it is becoming more apparent that an interdisciplinary approach is required for the solution of these complex problems. The modeling and description of physical phenomena, innovative mathematical approaches, and the generation of new computing architectures and algorithms all contribute to the problem solution. The proper combination of these disciplines will give the student emphasizing CFD the tools needed to address the next generation of problems. With this as an underlying theme, the interdisciplinary program in CFD was created. The synergism developed through the cooperation of the departments of Computer Science, Mechanical Engineering, and Mathematical Sciences, form a program which is academically strong and yet flexible enough to accommodate students with diverse backgrounds.

A student interested in pursuing the Master of Science or the Doctor of Philosophy degree with a specialization in Computational Fluid Dynamics must first affiliate with one of the following departments:

- Computer Science
- Mathematical Sciences
- Mechanical Engineering

Furthermore, a student takes a four-course core consisting of

a. MA 615
b. ME 653
c. CS 646

and one course chosen with the assistance of an advisor from
d. CS 647
e. MA 626
f. ME 654

After completing the core courses, a student may follow one of the tracks listed below and must satisfy the degree requirements as delineated in the Graduate Catalog under the particular department. The student's program will include a part or all of the courses listed here depending on the degree:

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Materials Science

Degree: Doctor of Philosophy awarded jointly by the
University of Alabama-Tuscaloosa (UA), the
University of Alabama at Birmingham (UAB), and the
University of Alabama in Huntsville (UAH).

UAH Program Director: C. Riley, Professor (Chemistry)

University Professor:
Anderson, E.E. (Physics); experimental solid state physics, magnetic and optical materials.

Professors:
Riley, C., Rosenberger, F.E., Sung, C.C.

Research Professor:
Fredericks, W.J.

Associate Professors:
Emerson, M.T., Ho, F.D., Meehan, E.J., Jr., Smith, J.E., Young, R.

Assistant Professors:
Bower, M.V., Setzer, W.N., Thomas, D.L.

Assistant Research Professor:
Kaukler, W.F.

Adjunct Faculty
More than 40 faculty members from UAB and UA make up the Adjunct Faculty. Each is an
expert in at least one area of science, engineering, or medicine.

The study of materials is concerned with the generation and application of knowledge relating
to the chemical composition, micro- and macro-structure, uses and properties (chemical,
physical, and mechanical), and processing of materials. The broad discipline which deals with
materials includes both science and engineering. On the side of the science of materials we find
the application of biology, biochemistry, chemistry, and physics. The relevant engineering
discipline, in particular ceramic, chemical, mechanical, and metallurgical, may generally be more
interested in processing and assessing properties. However, there is considerable overlap as scien-
tists become interested in uses and as engineers become interested in modifications that may
enhance value. Hence, materials science or materials engineering disciplines may overlap.

The program is novel in that the three University of Alabama System campuses offer a joint
doctoral program without a Materials Science department on any campus. Instead, faculty from
several departments constitute the program faculty. The overall program is governed by a com-
mittee of faculty members from the three campuses. The program is administer locally by the
Material Science Program Committee which is chaired by the UAH Program Director. Partici-
pating faculty are from the departments of Chemical Engineering, Chemistry, Engineering, Mechanics,
Metallurgical Engineering, Mineral Engineering, and Physics at UA, from the departments of
Biochemistry, Biomedical Engineering, Biomaterials, Chemistry, Materials Engineering,
Optometry, Physics, and the School of Medicine at UAB, and from the departments of Biological Sciences, Chemistry, Electrical Engineering, Mechanical Engineering, and Physics at UAH. Although science and engineering faculty participate, the program deals with the science of materials and leads to a Ph.D. degree in Materials Science with a diploma issued jointly by all three universities. The Program places special emphasis on production of new materials, on the application of materials to the needs of technology, and on materials processing.

Students entering the program are expected to have strong, but diverse, undergraduate training. They will typically have bachelor’s degrees in chemistry, chemical engineering, materials science, materials engineering, mechanical engineering, or physics. Owing to the differences in undergraduate concentration, students will have different basic knowledge in the field of materials science. We have structured our multidisciplinary curriculum to correct for these differences and to provide depth in a specialty area.

The faculties of each campus will build on their individual research strengths in providing options for students to pursue. These strengths currently fall into the following general curricular areas which we designate as options for specialization:

1. Materials structure and properties
2. Macromolecular materials
3. Electronic, optical, and magnetic materials
4. Materials processing
5. Biomaterials
6. Mechanical behavior of materials

Admission Requirements

In order to be unconditionally admitted to the doctoral program, a student must have satisfied the following set of minimum requirements common to all three universities.

1. A bachelor’s degree or its equivalent from an accredited college or university in engineering or one of the physical sciences;
2. A minimum B level scholarship overall or over the last 60 semester hours of undergraduate credit;
3. A minimum score of 1500 on the Graduate Record Aptitude Test;
4. TOEFL score greater than 550 in case of international students; and
5. Provide letters of reference.

An applicant whose scholastic record reveals a deficiency in one of the first three categories above may, upon recommendation of the UAH Program Director and approval of Graduate Dean, be admitted on a conditional basis as provided in the Graduate School regulations. The student must then follow the Graduate School’s policies in achieving unconditional admission status before completing Program Exam I.

Degree Requirements

Qualifying, Comprehensive and Other Program Examinations. Program Exam I is a four-part examination of the program’s core material and qualifies the student to enter the advanced program. The four parts are:

I. Structure and Analysis of Materials
II. Condensed Matter Science
III. Thermodynamics and Kinetics
IV. Structure, Processing and Properties

The exam is administered simultaneously System-wide by the Tricampus Coordinating Committee at preannounced dates. Students must pass all parts of the exam according to schedule which is available from the Program Director. Program Exam II is a comprehensive examina-

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tion covering material in the student’s specialization area. This examination is normally taken near the end of the formal coursework stage. Program Exam III is the final examination and is largely the student’s defense of the dissertation. Program Exams II and III are prepared, administered and graded by the student’s Graduate Supervisory Committee.

Coursework Requirements
Forty-eight credit hours of graduate-level coursework and twenty-four credit hours in activity related to the dissertation are required.

Candidacy and Dissertation Requirements
Admission to candidacy for the doctoral degree will be contingent upon the successful completion of Program Exam II, satisfaction of the foreign language requirement, and the successful presentation of a dissertation research proposal. Normally, a student will be considered eligible to take Program Exam II when all of the required coursework has been completed. After being admitted to candidacy, the student must then complete the remaining requirements for the degree, with the principal remaining requirement involving the doctoral research and dissertation.

Language Requirement
Each student is required to demonstrate reading proficiency in a foreign language, extensively used in the materials science field, which is not the native tongue of the student. Competency will be established by an examination which consists of the student translating (with dictionary) a research article, chosen by the student’s Graduate Supervisory Committee. The pass/fail determination will be made by the student’s Graduate Supervisory Committee with assistance from an appropriate Foreign Language faculty member.

Residence Requirement
The minimum period in which the doctoral degree can be earned is three full academic years of graduate study. The student must spend the last or penultimate academic year in continuous residence as a full-time graduate at one of the campuses.

Time Limits
All requirements for the doctoral degree must be completed within a period of six years after the completion of Program Exam II. Credits earned towards a Master’s or Ed.S. degree may be applied to the doctoral degree provided that they are applicable to the area of specialization or to the core. Dated credits may be accepted if recommended by a student’s supervisory committee, the UAH Program Committee, and approved by the Graduate School. For application toward this degree, the student may be required to demonstrate competence in the dated coursework.

Advisement
Students admitted into the program will be assisted in program planning and other academic matters by a temporary faculty advisor appointed by the Program Director. Also, for administrative reasons, upon being accepted in the program, students will be assigned to one of the participating departments as their temporary “home” department. They may apply for an assistantship and if awarded, the teaching or research duties would normally be assigned in that department by the department chair. A student may select a dissertation research project in a participating department other than the temporary home department. If the research project is acceptable to the UAH Materials Science Program Committee, a permanent advisor (normally the research supervisor selected by the student) will be assigned.
A Graduate Supervisory Committee will be appointed for the student as soon as the student passes Program Exam I and chooses a research project. This committee will normally include the research advisor as chairperson and at least four other members. The graduate committee members will be selected based on the student's academic interest and areas of research. At least one of the committee members will be from the student's research area at one of the other cooperating universities and another will be from a department other than the home department on the home campus. The graduate committee is charged with supervision and approval of the student's research and course of study toward the completion of all requirements leading to the award of the degree.

Graduate Courses in Materials Science (MTS)

Since the Materials Science program is interdisciplinary, most of the courses are offered through the participating departments. Thus, students are directed to the course listings in the departments of Biological Sciences, Chemistry, Electrical and Computer Engineering, Mechanical Engineering, and Physics. In addition, the courses listed below are offered for students in the program.

MTS 501 Introduction to Materials Science 3 hrs.
This course addresses the relationship between the structure and properties of materials, the factors controlling the internal structure of solids, and the processes for altering the structure and properties of solids. Metals, ceramics, polymers, and composites are considered, and methods for analysis and characterization of materials are reviewed. Perquisite: ME 294 or equivalent and senior- or graduate-level standing.

MTS 627 Instrumental Methods for Materials Characterization 4 hrs.
Prerequisite: CH 346 or 421 or equivalent course and permission of the instructor.

MTS 780 Materials Science Seminar 1 hr.
Required of doctoral students during each term of residence.

MTS 799 Doctoral Dissertation 3, 6, or 9 hrs.
Required each term student is enrolled and receiving direction on a doctoral dissertation.
School of Primary Medical Care

Dean J. Ellis Sparks, Professor and Chief of Internal Medicine Programs

Emergency Medicine
Clinical Instructors Beck, West; Lecturers Andrews, McGill.

Family Medicine
Professor Emeritus Grant; Associate Professors Crump, Everett (chief), Hubbard, Linder, Motley; Clinical Associate Professor Moessner; Adjunct Associate Professor Fleming; Associate Research Professor Janik; Clinical Assistant Professor Garber; Instructor Caldwell; Clinical Instructor Daniell; Fellow (Aerospace Medicine) Aten.

Internal Medicine
Professor Sparks (chief); Associate Professors Franco-Browder, Johnson; Clinical Associate Professors Patton, Schreeder, Tietke, R. Williams; Assistant Professors Crowder, Robbins; Clinical Assistant Professors Boyer, Hull, Morgan.

Medical Sociology
Professor McCalister.

Microbiology
Associate Professor Moore

Obstetrics and Gynecology
Emeritus Professor Corner; Professor Di Placido (chief); Assistant Professors Green, Light; Clinical Assistant Professor Harris; Clinical Instructor J. Hogan; Clinical Associates/OB-GYN Bottegal, Hughes, Sarge.

Pathology
Clinical Professor Litkenhous (chief); Lecturer Keebler.

Pediatrics
Professor Montgomery (chief); Clinical Professors Lester, Quirante, Stewart; Associate Professors Fleming, Knight; Assistant Professor Hornberger; Clinical Assistant Professor Powell.

Psychiatry
Professor Kramer (chief); Assistant Professor D. Hogan.

Radiology
Clinical Professor T. McKenzie (chief).

Surgery
Clinical Professors P. R. Kakani, Laughlin, Selah (chief), F. Smith; Clinical Assistant Professors Carpenter, Harriman, Lancaster.

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The School of Primary Medical Care of the University of Alabama in Huntsville offers courses for undergraduates interested in learning more about the health professions before entering medical school, dental school, or other health professional educational programs. The school also offers for undergraduate credit a paramedical program at the highest level of training for emergency medical technicians. Both groups of undergraduate courses are listed in this section.

The UAH School of Primary Medical Care offers professional medical training on three levels. For junior and senior medical students in the University of Alabama School of Medicine, the UAH School of Primary Medical Care offers a complete clinical education program. Through the School of Primary Medical Care, UAH jointly offers with Huntsville Hospital a three-year residency in family practice for medical school graduates who want specialized training to qualify for certification by the American Board of Family Practice. The school also sponsors or co-sponsors a variety of continuing medical education conferences and workshops to aid practicing physicians in maintaining licensure and certification requirements. All three programs are accredited through the University of Alabama School of Medicine (UASOM).

All UASOM freshman students are admitted to the parent school in Birmingham, where they complete their basic medical science training, which comprises the first two years of the undergraduate medical curriculum. Students then take their clinical clerkships and electives at the Birmingham, Huntsville, or Tuscaloosa campuses. Students who satisfactorily complete the medical curriculum are awarded diplomas from the University of Alabama School of Medicine.

Address correspondence about admission to the tri-campus UASOM to: Director of Admissions, University of Alabama School of Medicine, P.O. Box 100 University Station, Birmingham, Alabama 35294. Students or prospective students at UAH interested in premedical or predental baccalaureate programs are referred to the preprofessional advisor in the College of Science through the Office of the Dean of the College of Science.

Faculty and students of the School of Primary Medical Care are available for consultation with students interested in medicine and other health professions. Interested students are referred to the Office of Medical Student Affairs, UAH Clinical Science Center.

Goals

In accord with the mission, goals, and objectives of the UASOM, the mission of the program at Huntsville is to develop and maintain the following objectives:

1. A complete clinical program for junior and senior medical students that also demonstrates career options in primary-care disciplines.
2. Residency training programs in traditional primary-care disciplines to provide practicing physicians to meet the needs of Alabama.
3. Continuing medical education programs to provide physicians and other health-care professionals in North Alabama opportunities to stay abreast of advances in patient care.
4. Research in psychosocial and socioeconomic areas related to medicine and health care in general, as well as traditional biomedical research.
5. Ongoing patient-care services appropriate to the training of the school’s residents and medical students and the health needs of North Alabama.

Undergraduate Programs (UAH)

Admissions committees of professional schools expect competitive applicants to be knowledgeable concerning their fields of interest. To this end, the School of Primary Medical Care faculty work with faculty of other schools and divisions of UAH to offer courses for preprofessional students.

The University’s emergency medical service-paramedic training program is also offered through the SPMC. Upon successful completion of the program, the student is qualified to apply for licensure as an emergency medical technician-paramedic through the state Department of Public Health.
Prehealth Studies and Emergency Medical-Paramedic Training (MED)

### 100 Introduction to the Health Professions 1 hr.
Career options for undergraduate students interested in health professions. Basics of health-care delivery systems and terminology of health care. Primarily for freshman and sophomores. (Same as BYS 100).

### 191 Emergency Medical Technician-Basic 3 hrs.
Basic techniques of prehospital stabilization in emergencies such as traumatic injuries, cardiac arrest, and other life-threatening health conditions.

### 193 Emergency Medical Technician-Basic Lab 1 hr.
Laboratory course concurrent with MED 191. Application of techniques taught in MED 191 to real or simulated situations. Qualification for examination for Alabama EMT-Basic license upon successful completion of lecture and laboratory courses. Prerequisite: MED 191 or concurrent enrollment.

### 291 Emergency Medical Technical—Intermediate I 3 hrs.
Knowledge, understanding and skills needed to perform proper advanced airway management, proper administration of IV fluids and other advanced emergency care procedures. Prerequisites: MED 191 and 193, current Alabama EMT-Basic license, and admission qualifications as specified by the UAH EMT-Paramedic Educational Advisory Board.

### 292 Emergency Medical Technician—Intermediate II 1 hr.
Continuation of MED 291, focusing on medical emergencies and trauma life support. Lab fee: Level 8. Prerequisites: MED 291 and admission qualifications as specified by the UAH EMT-paramedic Educational Advisory Board.

### 293 Emergency Medical Technician—Intermediate Laboratory 4 hrs.
Application of techniques taught in MED 291, 292 and 294 to real or simulated situations. Successful completion of all Intermediate courses qualifies student to apply for the Alabama EMT-Intermediate license. Lab fee: Level 7. Prerequisites: MED 291, 292 and 294, and admission qualifications as specified by the UAH EMT-Paramedic Educational Advisory Board.

### 294 Emergency Medical Technician—Intermediate Electrocardiology 3 hrs.
A 40-hr. course which offers knowledge, understanding, and skills needed to interpret cardiac dysrhythmias in Lead II ECG, to better understand cardiac cell electrophysiology, and to relate the theory of common cardiac disease to non-lethal as well as death-producing dysrhythmias. Prompt recognition and therapeutic management are emphasized. Prerequisites: Admission qualifications as set down by the EMT-Paramedic Educational Advisory Board for EMT students. Open to all health care professionals.

### 391 Emergency Medical Technician-Paramedic Training 6 hrs.
Training in pharmacological intervention for emergency patients as identified by the State Committee on Public Health. Instruction about medications endorsed by the American Heart Association and U.S. Department of Transportation as essential or useful for the treatment of certain prehospital medical emergencies. Training in psychological first aid. Successful completion of course enables student to give advanced cardiac life support under a physician's direction. Prerequisite: admission qualifications as specified by the UAH EMT-Paramedic Educational Advisory Board.

### 393 Emergency Medical Technician-Paramedic Laboratory 6 hrs.
Application of techniques taught in MED 391 to real or simulated situations. Successful completion of lecture and laboratory courses qualifies student to apply for the Alabama EMT-Paramedic license. Lab fee: Level 9. Prerequisites: MED 391 and admission qualifications as specified by the UAH EMT-Paramedic Educational Advisory Board.
401 Introduction to Clinical Medicine (Preprofessional) 3 hrs.
On-site exposure and experience in clinical settings for preprofessional student. Student works in a minimum of five clinical areas in a local hospital. Weekly lectures cover topics from human anatomy to pathophysiology of disease. Prerequisite: junior or senior status and permission of instructor.

402 Social Epidemiology 3 hrs.
Predisposing and contributory social and cultural variables in acquisition and resolution of disease in human subpopulations. Interpretative models and logic of social epidemiology and relevant concepts and methods of descriptive and analytic epidemiology. Prerequisite: sophomore status.

403 Clinical Medical Sociology 3 hrs.
Systematic analysis of problematic behaviors of patients and health professionals in the acquisition, diagnosis, treatment, and resolution of illness. General and role-specific behaviors, contexts and interaction styles as variables in problem resolution or circumvention. Prerequisite: Junior or senior status.

Medical Programs (UASOM)
The medical student curriculum is determined by the School of Primary Medical Care faculty with the agreement of the Curriculum Committee of UASOM. The family practice residency curriculum is determined by the SPMC faculty in family medicine with the agreement of Huntsville Hospital and approval of the joint Residency Review Committee for Family Practice and the Accreditation Council for Graduate Medical Education. The medical-student and resident curricula of the UAH School of Primary Medical Care are subject to change through the mechanisms described above without prior notice.

Student Medical Education
The two-year clinical program of the School of Primary Medical Care completes the qualifications of students for the M.D. degree and for taking the Part II Examination of the National Board of Medical Examiners. The special focus of the program is on general clinical competencies in medicine, pediatrics, obstetrics and gynecology, surgery, and psychiatry that qualify a student for graduate training in all disciplines. It is intended that a student completing the program will be qualified to enter an approved residency in any field of medicine.

The clinical experiences are oriented toward the primary-care emphasis on comprehensive health maintenance, behavioral medicine, continuity of care, and consideration of the family as a unit of health care. In general, both the core and elective experiences involve a combination of inpatient and outpatient assignments, the latter including clinic and private office experience. Clinical conferences appropriate to each specific core clerkship and elective are scheduled.

Required clerkships include these areas:
- Obstetrics and Gynecology
- Pediatrics
- Family Medicine
- Psychiatry
- Internal Medicine
- Surgery

Medical Student Elective Program
Clinical electives offered by the UAH School of Primary Medical Care are characterized by:
1. A one-to-one faculty-student relationship in most offerings.
2. Experience with both hospital and ambulatory patient care.
3. Experience in early diagnosis of illness.
4. Experience through private practice exposure in nonmedical aspects of health care and practice.
Electives

Clinical Elective in Cardiology
Clinical Elective in Dermatology
Clinical Elective in Gastroenterology
Clinical Elective in Infectious Disease
Clinical Elective in Medical Oncology
Clinical Elective in Nephrology
Clinical Elective in Neurology
Clinical Elective in Pulmonary Medicine
Senior Subinternship in Medicine

Clinical Elective in Ambulatory Pediatrics
Clinical Elective in Pediatric Allergy
Clinical Elective in Private Pediatric Practice
Senior Subinternship in Neonatal Intensive Care
Senior Subinternship in Pediatrics
Developmental Pediatrics

Senior Elective in Obstetrics and Gynecology

Clinical Elective in Anesthesiology
Clinical Elective in Ear, Nose, and Throat
Clinical Elective in Neurological Surgery
Clinical Elective in Ophthalmology
Clinical Elective in Orthopedics
Clinical Elective in Plastic and Reconstructive Surgery
Clinical Elective in Cardiovascular Surgery
Senior Subinternship in General Surgery
Clinical Elective in Urology
Clinical Elective in Colon and Rectal Surgery

Senior Elective in Emergency Medicine

Research Elective in Health Behaviors
Research Elective in Social Factors in Human Reproduction

Clinical Elective in Radiology and Nuclear Medicine

Clinical Elective in Psychiatry

Clinical Clerkship in Family Medicine in North Alabama

Senior Elective in Clinical Pathology

During the clinical electives, student works in both hospital and office settings at the discretion of physician-supervisor, who extends graduated responsibility to student for care of private patients.

Family Practice Residency

The Family Practice Residency Program of UAH and Huntsville Hospital was the first approved residency in family practice in Alabama and the first residency program of any kind to be implemented in Huntsville. The purpose of the residency is to aid developing physicians in acquiring knowledge, skills, and attitudes necessary to become proficient family physicians.
who can provide families with comprehensive health care on a continuing basis. In acknowledge­ment of the need for continued medical education to maintain professional excellence, residents are encouraged to develop habits of learning and understanding that will help them assimilate current health-care information for the duration of their careers.

The residency training program is based in the UAH Family Practice Center, which is located in the UAH Medical Clinics across the street from the main building of Huntsville Hospital. Each family practice resident is assigned patients to be followed in the UAH Medical Clinics with necessary inpatient care at Huntsville Hospital. In addition to their hospital responsibilities the first year residents see family practice patients one-half day per week in the clinic. The patient load increases during the second and third year of the program.

The residents begin their training with concentrated in-hospital medicine. The first year consists of three months rotations in inpatient medicine pediatrics, obstetrics and gynecology, and surgery. These rotations are intensive in-hospital experiences combined with appropriate rotations of ambulatory and special intensive service areas. The family practice residents work closely with medical students on all of the core rotations. In the second and third years of the residency program the emphasis is on ambulatory care with increasing responsibility for both inpatient and outpatient hospital care. Rotations include one month each of neurology, orthopedics, cardiology, consultation medicine, dermatology, and two months of pediatrics. There is also a three-month block of general internal medicine during which the second year residents supervise and teach the first year residents and medical students.

Five months of the second and third years are spent on the Family Practice service. The residents see patients in their modules nine half days per week and manage patients that require hospitalization from their module. Rotations are also provided in ENT, Ophthalmology, Urology, Radiology and Psychiatry. Behavioral medicine is an integrated experience throughout the residency.

Of the seven months of electives during the second and third years of the residency, one month is allotted to a rural preceptorship. This month of rural preceptorship affords the resident direct exposure to a community practice in Alabama and offers the opportunity for a “real life” experience in medical care.

Further information on the UAH-Huntsville Hospital Family Practice Residency Program is available from: Director of the Family Practice Residency, UAH Medical Clinics, 201 Governors Drive, S.W., Huntsville, Alabama 35801.

Resources and Facilities
In all aspects of its work, the UAH School of Primary Medical Care depends upon active cooperation of hospitals and medical professionals of North Alabama. Huntsville Hospital with 578 beds is the largest hospital in North Alabama and serves as the primary teaching hospital in training family-practice residents.

Ownership and operational control of the hospital are vested in the Health Care Authority of the City of Huntsville. Because of its diversified medical staff, capacity, and specialized facilities, Huntsville Hospital serves as a regional referral health care center for northern Alabama and southcentral Tennessee. Huntsville Hospital and the Clinical Science Center and UAH Medical Clinics of the UAH School of Primary Medical Care form a geographic and functional nucleus for health-care education and delivery.

The UAH Medical Clinics building has been arranged, staffed, and equipped to facilitate demonstration of how primary physicians’ office practices, consultant services, and community resources may be integrated to provide continuing comprehensive care to individuals and families. The area of the building devoted to health services on a fee-for-service basis includes a number of practice modules, each with its own examination and consultation rooms, nursing
station, supply room, and waiting room. The modules are staffed by teams of faculty, residents, medical students, nurses, co-professionals, nursing students, and secretary-receptionists.

The UAH Medical Clinics facility also has a clinical laboratory, a radiology unit, an ambulatory surgical unit, and a pharmacy. The computerized business information system makes readily available accounts receivable data for patient billings and management-systems reports. The VA Outpatient Medical Clinic, located in the UAH Medical Clinics buildings, provides primary medical care on an outpatient basis for eligible veterans living in North Alabama. The Birmingham VA Medical Center continues to provide hospitalization and specialized laboratory and x-ray techniques and will continue to provide other specialty outpatient services for North Alabama veterans. The clinic in the UMC is staffed by SPMC internal medicine faculty and family practice residents, and there is medical student participation. The UAH Clinical Science Center houses administrative and faculty offices, medical student facilities, and academic support services. The location of the school’s Health Sciences Library in this building in the Huntsville medical district makes the collection conveniently available to area physicians and other health professionals as well as to medical students, residents, and faculty. The SPMC Library also serves as the primary literature resource and repository for Huntsville Hospital.

Through the UAH Library, of which it is a component, the SPMC Health Sciences Library has access to the Redstone Scientific Information Center at Redstone Arsenal. In addition, the professional staff of the Health Sciences Library works closely with library staff and services at Lister Hill Library in Birmingham and the National Library of Medicine in Bethesda, Maryland. The MEDLINE terminal in the SPMC Health Sciences Library makes available to the faculty, residents, medical students, and other members of the Huntsville medical community on-line searches through the data base of the National Library of Medicine.

The UAH Clinical Science Center also contains the laboratory and offices of the UAH Consortium for the Space Life Sciences. The Consortium, a multidisciplinary collaboration among the SPMC, the Johnson Research Center, and the Colleges of Science, Engineering, and Liberal Arts, conducts research in the space life sciences for NASA and other institutions, businesses, and agencies. As a community-based medical program, the School of Primary Medical Care has relied since its inception on area physicians to do a significant portion of the teaching of medical students and residents and on local hospital and clinic facilities as training sites. In return, the School has been a catalyst for expansion and diversification of available health services in the area. The medical services provided by the SPMC as part of the training of its students and residents are a major aspect of the services provided by UAH to the region and state.
Library

Director: Delmus E. Williams, B.A., M.S.L.S., Ph.D.
Professor: Perreault; Associate Professors: Pollard, Warren;
Assistant Professors: Herring, Kendrick, McNamara, Mead;
Instructor: McCann

Courses in bibliography are offered as electives only, with the exception of Bibliography of Business and Economics (BIB 230) which is a required course for students in the School of Administrative Science. Elective courses neither form nor contribute to a cluster; nor do they contribute to the certification requirements for teacher librarians. No credit is given toward GER.

### Bibliography (BIB)

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<tr>
<th>Course</th>
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<tr>
<td>100</td>
<td>Introduction to Library Research</td>
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<td>230</td>
<td>Bibliography of Business and Economics</td>
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<td>310</td>
<td>Bibliography of British and American Philology</td>
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<td>316</td>
<td>Bibliography of German Philology</td>
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<td>318</td>
<td>Bibliography of Romantic Philology</td>
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<td>Bibliography of American History</td>
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<td>345</td>
<td>Bibliography of the Health Sciences</td>
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<td>360</td>
<td>Bibliography of Behavioral Science</td>
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<td>380</td>
<td>Bibliography of Music</td>
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<td>385</td>
<td>Bibliography of Art</td>
<td>1 hr.</td>
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| 400      | Theory of Bibliographical Order            | 2 hrs.

- Introduction to Library Research: Organization of university libraries and their collections, use of major reference sources, and techniques of successful research.
- Bibliography of Business and Economics: Library research methods in business and economics; its production, organization and utilization of information; its reference and research materials.
- Bibliography of British and American Philology: Library research methods in British and American philology; production, organization, and utilization of information; reference and research materials. Alternate years.
- Bibliography of German Philology: Library research methods in German philology; production, organization, and utilization of information; reference and research materials. Alternate years.
- Bibliography of American History: Library research methods in the subject; production, organization, and utilization of information; reference and research materials.
- Bibliography of the Health Sciences: Library research methods in health sciences; production, organization, and utilization of information; reference and research materials.
- Bibliography of Behavioral Science: Origin and terminology of behavioral science; production and utilization of information; reference and research materials.
- Bibliography of Music: Library research methods in music; production, organization, and utilization of information; reference and research materials. Alternate years.
- Bibliography of Art: Library research methods in art; production, organization, and utilization of information; reference and research materials. Alternate years.
- Theory of Bibliographical Order: General structures of systems of bibliographical order: hierarchial trees, alphabetical files, juxtaposition and syndesis, facet analysis, thesauri. Prerequisite: BIB 100 or admission to an MLS program.
Division of Continuing Education

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The mission of the Division of Continuing Education is to provide the nontraditional student with the highest quality of learning opportunities through special activities. Credit and noncredit short courses, seminars, training programs and conferences are designed to enhance the professional and personal skills of its participants while building on the strengths of the University faculty, departments, and colleges. By identifying the educational needs of individuals, businesses, government, and special interest groups, the Division’s four units, described below, serve to stimulate lifelong potential through programs that are current and relevant in today’s changing world.

Professional Development

Professional Development develops and presents high quality professional training and educational activities in the areas of management development, computer applications, and science and engineering. Current trends and technological breakthroughs in these areas are translated into high quality seminars and customized training activities for individual and organizational clients in business, industry, and government.

Professional Development works to increase the productivity and effectiveness of its clients by creatively linking University faculty and staff, professional organizations and external resources to provide courses ranging from entry level skill development to the most recent advances in science, technology, and management. Beyond individual course offerings, Professional Development offers numerous certificate programs and professional certification review courses to provide in-depth study of areas that meet specific professional development needs. For more information call 1-800-448-4036.

Personal Development

Personal Development responds to the personal growth needs of the nontraditional student by providing credit and noncredit courses to serve special interests and scheduling needs.

Both credit and noncredit courses, designed to enhance and improve the quality of life for people of all ages, are offered in the liberal arts, administrative science, engineering, science, math, and physical education areas. Programs include Elderhostel, Kids’ College, self-enrichment courses and certificate programs, aquatics, fitness, lifetime sports, travel, and recreation. In cooperation with the academic units of the University, credit courses are offered on and off campus; late night, early morning, and weekend schedules are also available. For more information call (205) 895-6007.

Listener's License

Personal Development also coordinates the Listener’s License program, which allows participants who have not been previously admitted to the University to attend regular credit classes.
Listeners are not required to take tests or meet attendance requirements. The Listener’s License fee is $59 per course and included UAH Library privileges. To register or determine which courses are available for listening, call (205) 895-6355.

Only select courses are available through the Listener’s License program. No academic or CEU credit is awarded. Participants must be at least 16 years old or high school seniors. Students under disciplinary or academic suspension from any college or university are ineligible to register as a listener.

Conferences
The Conference Unit develops, coordinates, and promotes programs of specialized interest, primarily within the research areas of the University. Specifically, the unit sponsors conferences, institutes, and workshops, in cooperation with the University academic colleges and research centers, private industry, professional associations, and government agencies. The activities often attract experts in the appropriate fields to participate as speakers.

The goal in coordinating each program is to deliver a comfortable, professional setting under University auspices and provide a learning environment in which the participants are free to focus attention on the presentation. For more information call 1-800-448-4035.

Teaching The Future
Teaching the Future develops and conducts in-service, graduate credit programs that provide hands-on experience for elementary and secondary professional educators in the fields of science, mathematics, and social studies. In an effort to improve science education in the nation’s schools, several of the programs acquaint educators with all dimensions of current developments in aerospace activities, including their social and international implications. Programs include Space Orientation for Professional Educators, Physical Activities for Learning Science, and Capital-Area Space Orientation. For more information call 1-800-448-4032.

Training and Meeting Facilities
The Division of Continuing Education utilizes the auditoriums, training facilities, classrooms, and residential accommodations located on the UAH campus. In addition, the Division has its own computer training facility equipped with four IBM Compatible laboratories and one Apple Macintosh laboratory. Sports & fitness activities are centrally located in the Spragins Hall athletic facility. Other Continuing Education activities are held at various locations throughout the community.

The Division of Continuing Education's central offices are located in the Tom C. Bevill Center, a full-service conference facility. The Bevill Center is easily accessible to other University conference facilities.

Registration and Course Information
Registration of Continuing Education is primarily handled by the Division of Continuing Education Business Office located in the Tom C. Bevill Center, Room 154, or by calling (205) 895-6010, or toll-free 1-800-448-4031. Registration in noncredit courses does not require admission to UAH as a regular University student; however, admission may be required to register for certain credit courses. Policies governing credit and noncredit courses taken through the Division are as follows:
Credit Courses

If a student wishes to apply a Continuing Education credit course towards a degree, the student must first be admitted to the University as a degree candidate; and second, the credit must be approved by the appropriate academic department chairperson.

If a student does not wish to receive academic credit for a credit course, they may choose to audit the course. The audit option has no grading, testing, or attendance requirements. This request must be made at the time of registration.

NonCredit Courses

Continuing Education Units (CEUs) are awarded to students who satisfactorily complete non-credit courses. One CEU is equal to 10 contact hours of participation in an organized continuing education experience under responsible sponsorship, capable direction, and qualified instruction. The number of CEUs awarded for each class is designated in each course description. A record of CEUs is kept by the Division of Continuing Education, and an official transcript may be obtained upon written request. A $3 fee is charged per manuscript.

A quarterly catalog and brochures of complete course description are available by calling the Division of Continuing Education Business Office at 895-6010, or toll-free 1-800-448-4031.
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Samuel P. McManus, B.S., M.S., Ph.D. ............Dean, School of Graduate Studies
Ellis Sparks, B.S., M.D.................................Dean, School of Primary Medical Care
Ron R. Koger, B.S.Ed., M.Ed., Ed.D ...............Assistant Vice President for Enrollment Management
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ABUSHAGUR, MUSTAFA, B.Sc. (Tripoli University), M.Sc., Ph.D. (California Institute of Technology). Associate Professor of Electrical Engineering, 1984.*

ADAMS, CURTIS H., B.S. (Mississippi State University), M.S.Ed. (Henderson State Teachers College), Ph.D. (Mississippi State University). Professor Emeritus, 1965.


ADHAMI, REZA, B.S.E., M.S.E., Ph.D. (University of Alabama in Huntsville). Assistant Professor of Electrical Engineering, 1984.*


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ARENDALE, WILLIAM F., B.S. (Middle Tennessee State University), M.S., Ph.D. (University of Tennessee). Professor Emeritus, 1964.

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BAIRD, JAMES K., B.S. (Yale University), M.A., Ph.D. (Harvard University). Professor of Chemistry, 1982.*

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BURGE, JANET MARIE, R.N. (Hendrick Memorial Hospital School of Nursing), B.S. (HardinSimmons University), M.N. (Emory University), Ph.D. (University of Florida). Director of Graduate Program and Professor of Nursing, 1980.*

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CACHAN, MANUEL, B.A. (Rollins College), M.A., Ph.D. (Tulane University). Assistant Professor of Spanish, 1989.


Campbell, P. Samuel, B.S. (Marietta College), M.S. (Ohio University), Ph.D. (Purdue University). Professor of Biological Sciences, 1973.*

Carpenter, Sandra L., B.A. (California State University), Ph.D. (University of California). Assistant Professor of Psychology, 1989.


Chan, Chia Hwa, B.S., Ph.D. (London University). Professor of Physics, 1970.*

Chang, Mou-Hsiung, B.S. (Chung-Hsing University), M.S., Ph.D. (University of Rhode Island). Professor of Mathematical Sciences, 1974.*

Chen, Chien P., B.S. (National Taiwan University), M.S., Ph.D. (Michigan State). Assistant Professor of Chemical Engineering, 1986.*

Cheng, Hai-Yuin, B.S. (College of Chinese Culture), M.S., Ph.D., (Boston College). Assistant Research Professor of Physics, 1986.

Chipman, Russell A., B.S. (Massachusetts Institute of Technology), B.S. (California Institute of Technology), M.S., Ph.D. (University of Arizona). Assistant Professor of Physics, 1988.*

Cholewinski, Jane E., B.S.N., M.S.N. (University of Alabama, Birmingham). Ph.D. (University of Alabama, Tuscaloosa). Director of RN Education and Associate Professor of Nursing, 1978.*

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Coble, Harold Dwain, B.S., (Kearney State College), M.S., Ph.D. (University of Nebraska). Associate Professor of Chemistry, 1966.*

Coffield, Kenneth E., A.B. (University of Kansas), M.A. (DePaul University), M.A., Ph.D. (University of Missouri). Associate Professor Emeritus, 1966.

Colclough, Glenna, B.A., M.A. (Kent State University), Ph.D. (University of Georgia). Associate Professor of Sociology, 1984.*


Contreras, Frank, B.M. (Millikin University), M.M. (East Carolina University), D.M.A. (West Virginia University). Assistant Professor of Music, 1977.

Cook, F. Lee, B.S., M.S., Ph.D. (Georgia Institute of Technology). Associate Dean, College of Science and Associate Professor of Mathematical Sciences, 1967.*

COST, THOMAS L., B.S.A.E. (University of Alabama, Tuscaloosa), M.S.A.E. (University of Illinois), Ph.D. (University of Alabama, Tuscaloosa), P.E. Professor of Mechanical Engineering, 1985.*

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FINLEY, NANCY, J., B.A., M.A., Ph.D. (University of Oklahoma). Chair and Associate Professor of Sociology, 1982.*

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HAYS, DANIEL, B.A., M.A., Ph.D. (University of Missouri). Associate Professor of Psychology, 1973.*

HEAMAN, DORIS, R.N. (Deaconess Hospital, Missouri School of Nursing), B.S.N. (University of Alabama, Huntsville), M.S.N. (University of Alabama, Birmingham). Assistant Professor of Nursing, 1975.

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HENZE, REET L., B.S.N. (Gustavus Adolphus College), M.S.N. (University of Colorado). Associate Professor of Nursing, 1973.*

HERMANN, RUDOLF, Ph.D. (Leipzig University), Dr. Phil habil. (Aachen Institute of Technology, Germany). Professor Emeritus, 1962.

HERRING, SUSAN D., B.A., M.A. (University of Alabama, Huntsville). Assistant Professor of Bibliography, 1986.

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HO, FAT Duen, B.S.E.E. (South China Technological Institute, China), B.A. (Chu Hai College, Hong Kong), M.S.E.E., Ph.D., (Southern Illinois University at Carbondale). Associate Professor of Electrical Engineering, 1980.*

HODGES, H. EUGENE, A.B., M.A. (University of Georgia), Ph.D. (University of Minnesota). Associate Professor of Sociology, 1975.

HOFMANN, MARTIN O., B.S. (Technische Universitat Wien), M.S. (Vanderbilt University), Ph.D. (Vanderbilt University). Assistant Professor of Electrical and Computer Engineering, 1988.*

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HOOPER, JAMES W., B.S. (Florence State University), M.S. (Auburn University), M.S. (University of Missouri), Ph.D. (University of Alabama, Birmingham). Associate Professor of Computer Science, 1980.*

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HUNG, RU J., B.S. (National Taiwan University), M.S. (University of Osaka), Ph.D. (University of Michigan), P.E. Professor of Mechanical Engineering and Adjunct Professor of Atmospheric and Environmental Science, 1972.*


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JAMES, ROBERT E., B.S. (Carnegie Institute of Technology), M.A. (Rollins College), Ph.D. (University of Tennessee). Associate Professor of Psychology and Adjunct Associate Professor of Communication Arts, 1971.*

JANIK, DANIEL SCOTT, B.A. (University of Washington), M.P.H. (University of California), M.D. (Loma Linda University). Associate Research Professor of Family Medicine, 1989.

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KATSINIS, CONSTANTINE, B.S. (National Technical University of Athens), M.S., Ph.D. (University of Rhode Island). Assistant Professor of Electrical Engineering, 1985.


KENDRICK, AUBREY WAYNE, B.A. (Georgia Southern College), M.S.L.S., M.B.A. (Florida State University). Assistant Professor of Bibliography, 1985.
KILGO, REESE D., B.A. (University of Alabama, University), M.Ed. (University of Florida), Ph.D. (University of Texas). Associate Professor Emerita, 1966.

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MC COLLUM, JAMES K., B.S. (U. S. Military Academy, West Point), M.A. (University of Dayton), M.P.A. (University of Cincinnati), Ph.D. (Virginia Polytechnic Institute and State University). Professor of Management, 1984.*

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MC MANUS, SAMUEL P., B.S. (The Citadel), M.S., Ph.D. (Clemson University). Dean of Graduate School and Professor of Chemistry, 1966.*


MC NIDER, RICHARD T., B.S. (University of Alabama, Tuscaloosa), M.S. (Florida State University), Ph.D. (University of Virginia). Associate Professor of Mathematical Sciences and Adjunct Associate Professor of Atmospheric and Environmental Science, 1985.*

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MEEK, ROY L., B.A., M.A. (University of Oklahoma), Ph.D. (University of Oregon). Dean of College of Liberal Arts and Professor of Political Science, 1981.*

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ROSENBERGER, FRANZ E., B.S., Diploma (University of Stuttgart, Germany), Ph.D. (University of Utah). Professor of Physics and Director, Center for Microgravity Research, 1986.*

ROZELL, BILLIE R., R.N. (St. Mary’s Memorial Hospital), B.S.N., M.S.N., D.S.N. (University of Alabama, Birmingham). Associate Professor of Nursing, 1989.*

RUSSELL, LYNN, B.S., M.S. (Pennsylvania State University), M.S. (Pennsylvania State University), Ph.D. (University of Illinois). Associate Professor of Economics, 1990.

RYAN, J. PATRICK, B.S. (Purdue University), M.A., Ph.D. (Yale University). Associate Professor of Computer Science, 1986.*

SARVER, F. LEE, B.A., M.A., Ph.D. (University of Tennessee). Assistant Professor of Finance, 1989.*

SCHENKER, DANIEL, B.A. (Brandeis University), M.A., Ph.D. (John Hopkins University). Associate Professor of English, 1984.*


SCHOENING, NILES C., B.A. (Columbia University), M.C.P. (Ohio State University), Ph.D. (University of Tennessee). Chair of Economics and Finance, Associate Professor of Economics, 1983.*
SCHONBERG, WILLIAM P., B.S.E. (Princeton University), M.S., Ph.D. (Northwestern University). Associate Professor of Civil Engineering, 1986.*

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SHERMAN, J. DANIEL, B.S. (University of Iowa), M.A. (Yale University), Ph.D. (University of Alabama, Tuscaloosa). Chairman of Management and Marketing and Associate Professor of Management, 1981.*


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SIEGRIST, KYLE T., B.S., M.S., Ph.D. (Georgia Institute of Technology). Associate Professor of Mathematical Sciences, 1980.*


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SLATER, PETER J., B.S. (Iona College), M.S., Ph.D. (University of Iowa). Professor of Mathematical Sciences, 1981.*

SMALLEY, LARRY L., B.S., M.S., Ph.D. (University of Nebraska). Professor of Physics, 1967.*

SMITH, JAMES E. JR., B.S.E., Ph.D. (University of South Carolina). Associate Professor of Chemical Engineering, 1982.*


SOUDER, WILLIAM E., B.S. (Purdue University), M.B.A., Ph.D. (St. Louis University), Eminent Scholar in Management, Professor of Management Science and Professor of Engineering, 1990.


SPARKS, J. ELLIS, B.S. (Emory University), M.D. (Medical College of Alabama). Dean, School of Primary Medical Care; Chief of Internal Medicine Programs and Professor of Internal Medicine; Associate Dean of the University of Alabama School of Medicine and Director of Medical Affairs at Huntsville, 1974.

SPITZ, ALLAN, B.A. (University of New Mexico), M.A., Ph.D. (Michigan State University). Chairman and Professor of Political Science, 1985.*


STENSBY, JOHN, B.S.E.E. (University of Alabama, Tuscaloosa), M.S.E. (University of Alabama, Huntsville), Ph.D. (Texas A&M University). Associate Professor of Electrical Engineering, 1984.*

STROMECKY, OSTAP, M.A. (Vanderbilt University), Ph.D. (University Libera Ukraine, Pragensis). Assistant Professor of Slavic Languages, 1967.

SULLINS, WALTER R., A.B. (Stetson University), B.D. (Southern Baptist Seminary), M.A., Ph.D. (Emory University). Associate Professor of Psychology, 1966.

SUNG, CHI-CHING, B.A. (National Taiwan University), Ph.D. (University of California, Berkeley). Professor of Physics, 1972.*

SZILAGYI, STEPHEN J., B.A. (Clark University), M.A., Ph.D. (Lehigh University). Assistant Professor of English, 1988.*

TAKAHASHI, YOSHIYUKI, B.S. (Saitama University, Japan), M.S. (Kanazawa University, Japan), Ph.D. (Osaka University, Japan). Associate Research Professor of Physics, 1986.*

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TARTER, DONALD E. B.S. (Middle Tennessee State College), Ph.D. (University of Tennessee). Associate Professor of Sociology, 1966.

THOMAS, DANIEL L., B.S., Ph.D. (Brigham Young University). Assistant Professor of Chemical Engineering, 1986.


TORR, DOUGLAS G., B.Sc., Ph.D. (Rhodes University, South Africa). Research Professor of Physics, 1985.*

TITARD, PIERRE L., B.S. (Louisiana State University), M.B.A. (Louisiana State University), Ph.D. (Louisiana State University). Chairman of Department of Accounting & Business Legal Studies and Professor of Accounting, 1990.


TSENG, FAN-TSONG, B.S. (National Chaio Tung University), M.S., Ph.D. (University of Texas, Dallas). Associate Professor of Management Information Systems and Management Science, 1984.*

TYTULA, THOMAS P., B.S. (Auburn University), M.S., Ph.D. (University of Alabama, Huntsville). Associate Professor of Industrial and Systems Engineering, 1988.*
UBER, JAMES G., B.S. (Bradley University), M.S., Ph.D. (University of Illinois). Assistant Professor of Civil Engineering, 1987.*

VAUGHAN, WILLIAM W., B.S. (University of Florida), Ph.D. (University of Tennessee). Research Professor of Atmospheric Science, 1989.

WALKER, JACK R., B.S. (Mississippi State University), M.S. (Georgia Institute of Technology), Ph.D. (Oklahoma State University), P.E. Associate Professor of Industrial and Systems Engineering, 1982.*

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WALLEY, WILLIAM C., B.S. (Auburn University), M.D. (University of Alabama School of Medicine). Associate Professor of Family Medicine, 1990.

WARING, STEPHEN P., B.A. (Doane College), M.A., Ph.D. (University of Iowa). Assistant Professor of History, 1988.*

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WESSLING, FRANCIS C., B.S. (Washington University), M.S. (University of New Mexico), Ph.D. (University of Minnesota). Professor of Mechanical Engineering, 1988.*


WHARRY, RHODA E., B.S.E. (University of Arkansas), M.S. (Memphis State University), Ph.D. (Purdue University). Professor Emerita, 1967.

WILHITE, ALLEN W., B.A. (Eastern Illinois University), M.A., Ph.D. (University of Illinois). Associate Professor of Economics, 1988.*

WHILLOCK, DAVID E., B.A. (Hendrix College), M.A. (University of Arkansas), Ph.D. (University of Missouri). Assistant Professor of Communication Arts, 1986.

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WHITE, CAROLYN, A.B. (University of North Carolina, Greensboro), M.A., Ph.D. (Duke University). Professor of History and Associate Vice President for Academic Affairs, 1967.*
WHITE, JOHN, B.A. (Washington & Lee University), M.A., Ph.D. (Duke University). Chairman and Professor of History Department and Interim Chairman of Foreign Languages and Literature, 1967.*

WILLIAMS, LEE E., II, B.A. (Knoxville College), M.A. (East Tennessee State University), Ph.D. (Mississippi State University), Associate Professor of History, 1972.*

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WILLIAMSON, JOAN, R.N. (Birmingham Baptist Hospital), B.S.N. (University of Alabama, University), M.S.N., D.S.N. (University of Alabama, Birmingham). Associate Professor of Nursing, 1973.*

WILSON, HAROLD J., B.S. (Alabama A&M University), M.S. (Iowa State University), Ph.D. (University of Arizona). Dean of the College of Science and Professor of Biological Sciences, 1972.*


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WRIGHT, JOHN C., B.S. (W.V. Wesleyan College), Ph.D. (University of Illinois), University Professor of Chemistry, 1978.*

WU, SHI TSAN, B.S. (National Taiwan University), M.S. (Illinois Institute of Technology), Ph.D. (University of Colorado). Professor of Mechanical Engineering and Adjunct Professor of Physics, 1967.*

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Lecturers

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BABCOCK, EDWARD STANLEY, JR., B.S. (U.S. Military Academy, West Point), M.A.S. (University of Alabama, Huntsville), Ph.D. (Baylor University), Assistant Professor of History and Philosophy, 1984.


BUSH, KATHLEEN C., B.S. (Oral Roberts University), M.S.(University of Alabama, Huntsville). Lecturer in Biological Sciences, 1982.


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CASTELLANO, B. MICHAEL, B.S. (University of South Florida), Ph.D. (Tulane University). Lecturer in Mathematics, 1981.*

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CHARERNKAVANICH, DUSIT, B.S. (Prasornmitr College, Thailand), M.S. (National Institute of Development Administration, Thailand), Ph.D. (University of Georgia). Lecturer in Computer Science, 1981.

CHASTEEN, MELBA M., B.A. (Samford University), M.A. (University of Alabama, Tuscaloosa). Lecturer in English, 1983.


DAHAGAM, CHANDRASHEKAR, B.S.E.E. (Osmania University, India), M.S.E. (University of Alabama, Huntsville). Lecturer in Electrical Engineering, 1986.
DAKHOUL, YOUSSEF M., B.S., M.S. (Cairo University), Ph.D. (Ohio State University). Adjunct Professor of Mechanical Engineering, 1990.


DOUTHIT, FLOYD, B.S. (Jacksonville State University), M.A. (University of Texas), Lecturer in H.P.E.R., 1980.

DURHAM, JAMES, B.S. (University of Missouri-Rolla), M.S. (University of Tennessee). Lecturer in Mechanical Engineering, 1989.


ELAHI, ALI, B.S.E.E. (Mississippi State University), M.S.E., Ph.D. (University of Alabama, Huntsville). Lecturer in Electrical Engineering, 1986.


ESSENWANGER, OSKAR, B.S. (Technical University, Danzig), Diploma in Meteorology, (University of Vienna), Sc.D. (University of Wuerzburg). Lecturer in Civil Engineering, 1971.


FAN, XIAHONG, B.S. (Harbin Engineering Institute, China), M.S.E., Ph.D. (University of Alabama, Huntsville). Lecturer in Electrical Engineering, 1986.

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GARBER, JEFFREY G., B.A. (Vanderbilt University), M.D. (University of Louisville School of Medicine). Clinical Assistant Professor of Family Medicine, 1984.


GREENWOOD, TERRY, B.S. (Georgia Institute of Technology), M.S. (University of Southern California), Ph.D. (University of Texas). Lecturer in Mechanical Engineering, 1984.

GUINN, GERALD R., B.S. (Auburn University), M.S. (Purdue University), Ph.D. (University of Alabama). Adjunct Professor of Mechanical Engineering, 1974.


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HARRIS, RICHARDS., B.A. (Fisk University), M.D. (Meharry Medical College). Clinical Assistant Professor of Obstetrics and Gynecology, 1978.


HILL, LARRY, B.E.E. (Georgia Institute of Technology), M.S.E.E. (University of Tennessee). Lecturer in Electrical Engineering, 1986.


HULL, RICHARD P., M.D. (University of Mississippi School of Medicine). Clinical Assistant Professor of Internal Medicine - Neurology, 1979.


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KEEBLER, DOROTHY LYNN, B.S. (Fairleigh Dickinson University), M.S. (Upstate Medical Center, New York). Lecturer in Pathology, 1976.


KUMAR, GANESH N., B.S. (Bangalore University), M.S. (Indian Institute of Technology), Ph.D. (Auburn University). Adjunct Professor of Mechanical Engineering, 1990.

LANCASTER, J. ROBERT, B.C.E. (Auburn University), M.D. (University of Alabama School of Medicine). Clinical Assistant Professor of Surgery, 1986.


LAUGHLIN, EDWARD H., B.A. (University of Virginia), M.D. (Duke University School of Medicine). Clinical Professor of Surgery, 1974.

LAVAN, OLGA, B.A. (University of Texas), M.A. (University of Iowa). Lecturer in English, 1978.

LEHOCZYK, SANDOR L., B.A. (King College), Ph.D. (University of North Carolina). Lecturer in Chemistry, 1986.


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LITKENHOUS, EDWARD E., JR., B.E., M.D. (Vanderbilt University). Chief of Pathology Programs and Clinical Professor of Pathology, 1974.

LOLLAR, LOUIS F., B.S. (Auburn University), M.S.E. (University of Alabama, Huntsville). Lecturer in Electrical Engineering, 1983.


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MC COLLUM, BARBARA L., B.S. (State University of N.Y.), M.A. (University of Dayton), Instructor in English, 1984.

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MURPHY, J. M., B.S., Ph.D. (Purdue University). Adjunct Professor of Mechanical engineering, 1989.


NOURI, JOSEPH, B.S.E. (University of Michigan), M.S.E., Ph.D. (University of Tennessee Space Institute). Lecturer in Mechanical Engineering, 1989.

NUNES, ARTHUR, B.S.M.E., M.S.M.E. (Massachusetts Institute of Technology), Ph.D. (University of California, Berkeley), 1981.


OLIVER, JAMES M., B.S., M.S. (Louisiana State University), Ph.D. (University of Colorado). Lecturer in Mathematics and Mechanical Engineering, 1983.


PALMER, JAMES, B.A. (University of the South), M.A. (University of Alabama, Huntsville). Instructor in English, 1982.

PAPADOUPOLOS, JAMES, G., B.S. (Massachusetts Institute of Technology), M.S. (Southern Methodist University). Lecturer in Mechanical Engineering, 1981.

PATTON, STEPHEN R., B.A. (University of Iowa), M.D. (University of Iowa School of Medicine). Clinical Associate Professor of Internal Medicine, 1987.


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SCHUMANN, J. PAUL, B.A., M.A. (University of Mississippi), Ph.D. (University of Oklahoma). Lecturer in Political Science, 1981.

SCHUTZENHOFER, LUKE, B.S.A.E., (St. Louis University), M.S.E. (University of Alabama, Huntsville), Ph.D. (University of Alabama, Tuscaloosa). Lecturer in Mechanical Engineering, 1972.


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SNYDER, ROBERT S., B.S. (Kenyon College), M.S. (University of North Carolina), Ph.D. (University of Virginia). Lecturer in Chemistry, 1985.*


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